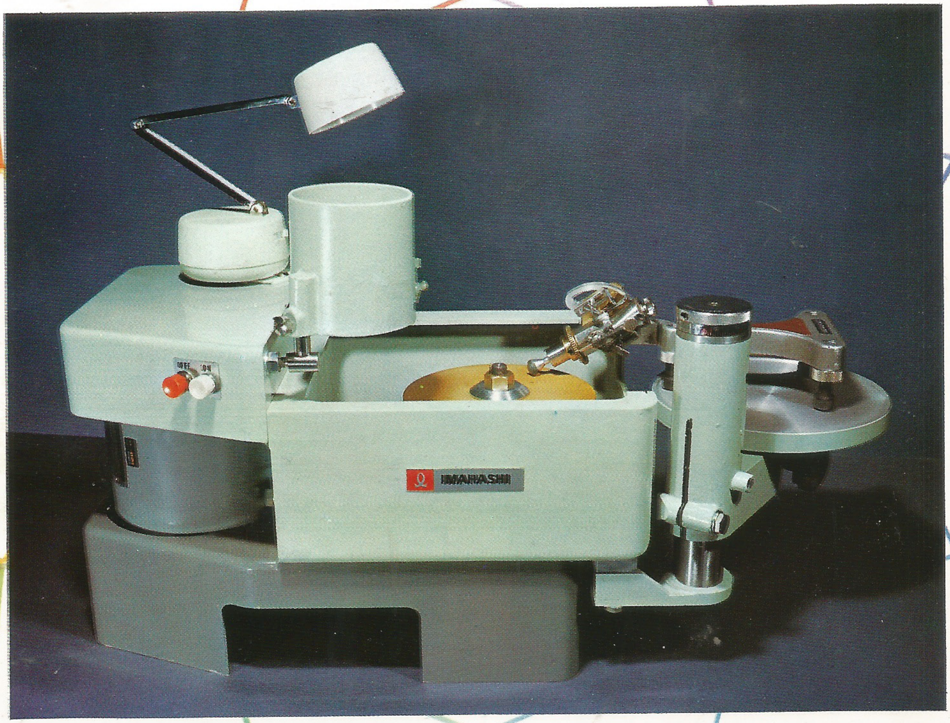
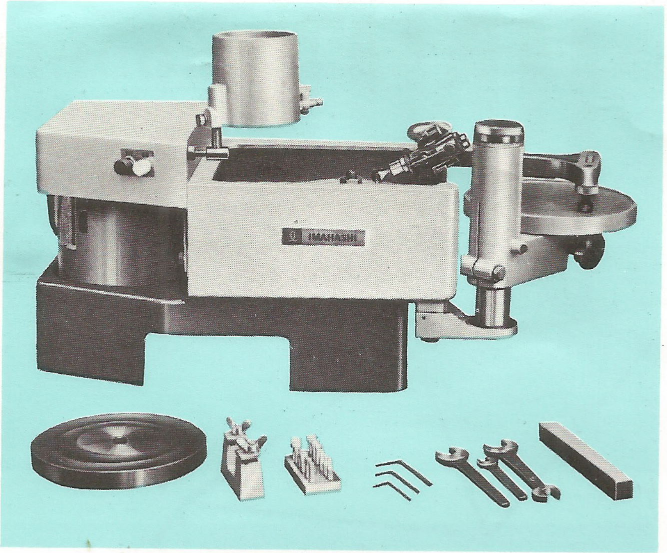
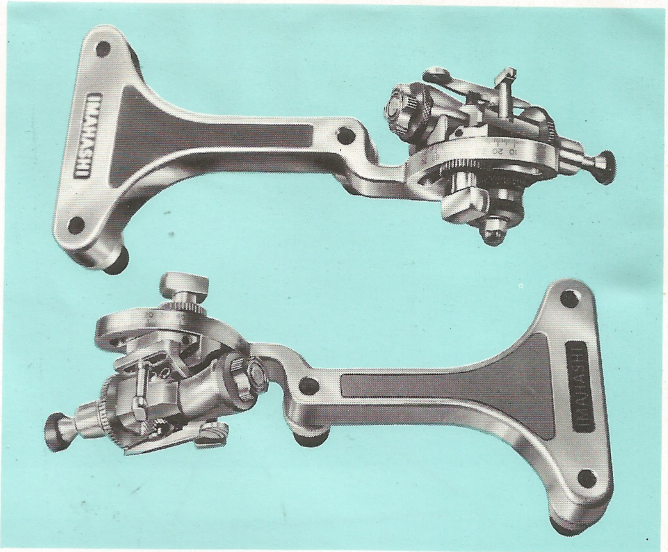
FACETING UNIT

MODEL
FAC-8



IMAHASHI MFG. CO., LTD.





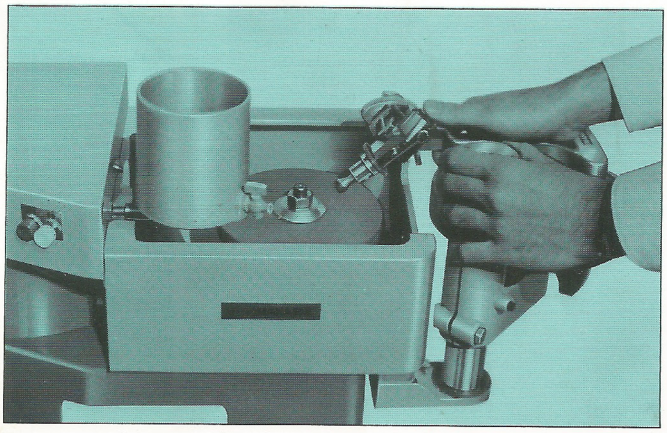
IDEAL FACETING UNIT FOR PROFESSIONALS AND HOBBYISTS

TWO GREAT FEATURES

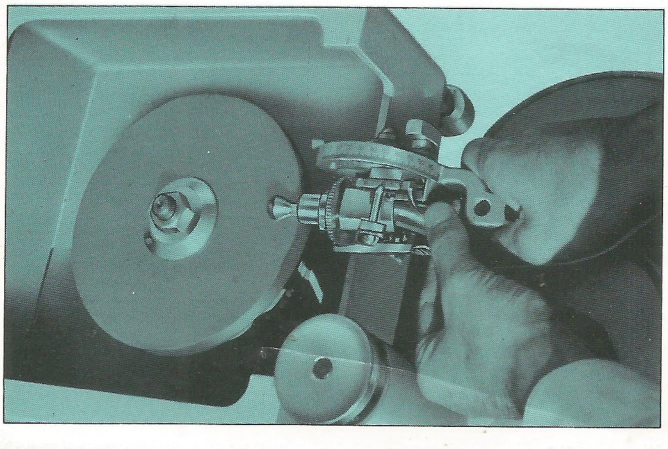
A replaceable cam permits easy preforming and cutting of various shapes such as standard brilliant, marquise, oval and others, from perfectly round to long and narrow.

The cutting angle of the stone is automatically determined by the cam--from zero to maximum angle--by adjusting the position of the cam follower.

Faceting the main facet



Girdle preforming



OTHER CHARACTERISTICS

Cutting of the table facet is easy by setting the pointer to zero degree, with no need to use a 45 degree dop stick.

Amateurs and professionals can enjoy precision faceting, cabochon-making and also trimming or grinding of gemstones with this single machine.

Faceting the star facet

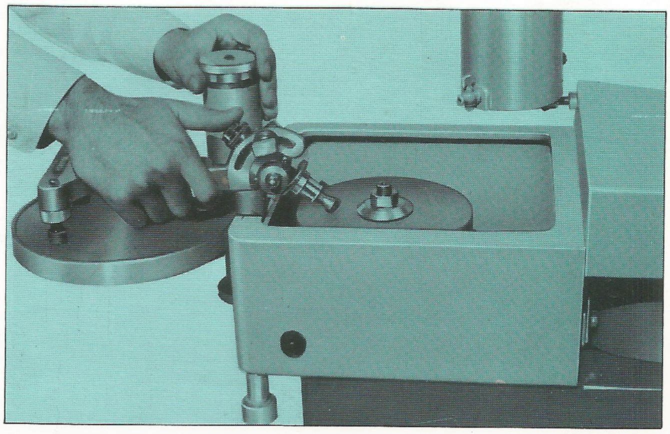
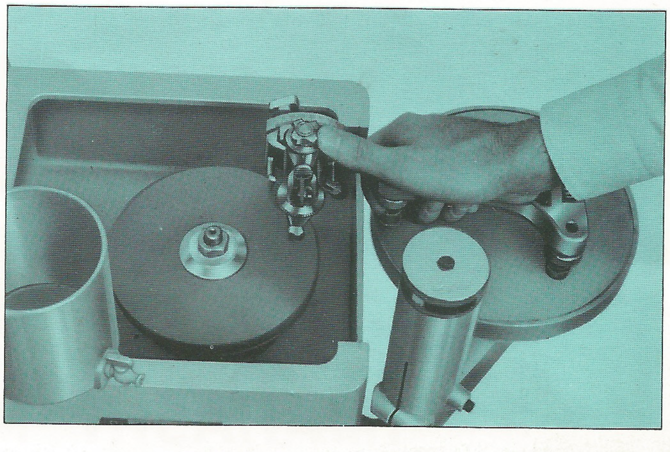


Table cutting



The IMAHASHI Faceting Unit consists of the following main components:

(1) Lap Assembly

The Lap Assembly consists of a cast aluminum housing in which the lap arbor is firmly mounted.

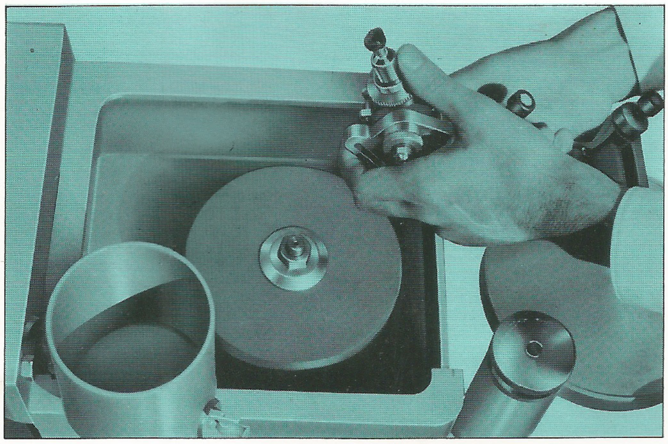
The lap arbor is constructed with completely sealed ball bearings and insures smooth running, with no vibration.

(2) Faceter Table

The Faceter Table has a steel column, a cast iron bracket and aluminum table on which the faceter rests.

Adjustment of the distance between lap and table is easy performed by eccentric movement of the table.

The table is raised or lowered in relation to the lap by micrometer dial to allow the operator accurate control of the cutting depth.

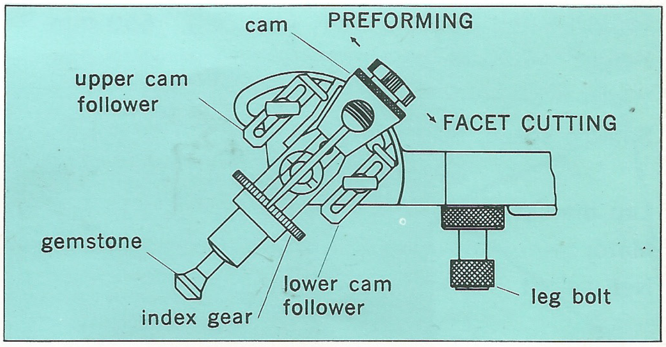


(3) Faceter

This faceter consists of cast aluminum frame with protractor to set of the cutting angle, and faceter spindle assembly made of rust-proof material.

The replaceable cam, which is mounted on the end of the faceter spindle, enables the operator to provide accurate girdle preforming and to set the ideal cutting angle.

Since this faceter is not connected to the table, it may quickly be lifted off the table and turned inside out in any position desired to inspect the progress of the work.



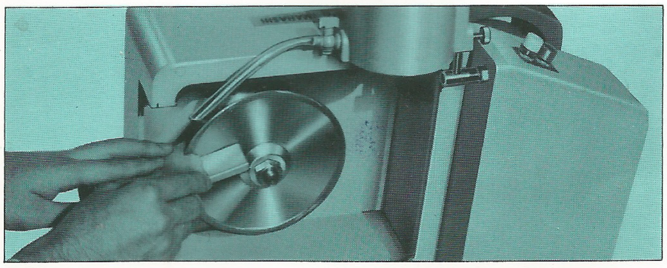
Even a beginner can perform difficult cuts like brilliant oval, marquise etc., with a small amount of practice.

Also by use of various cams, you can create or develop entirely new cuts to your own design.

OTHER USES

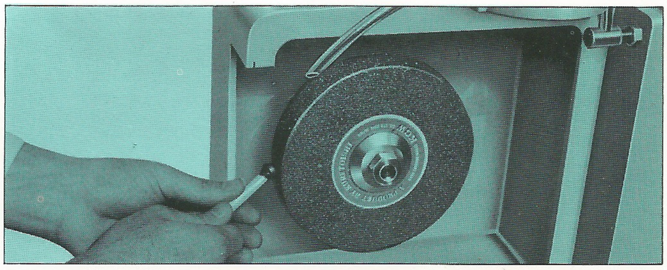
Trimming, grinding, sanding, lapping and polishing can all be done with the same machine.

Trimming

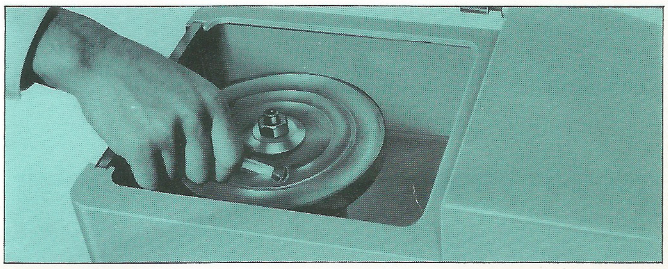


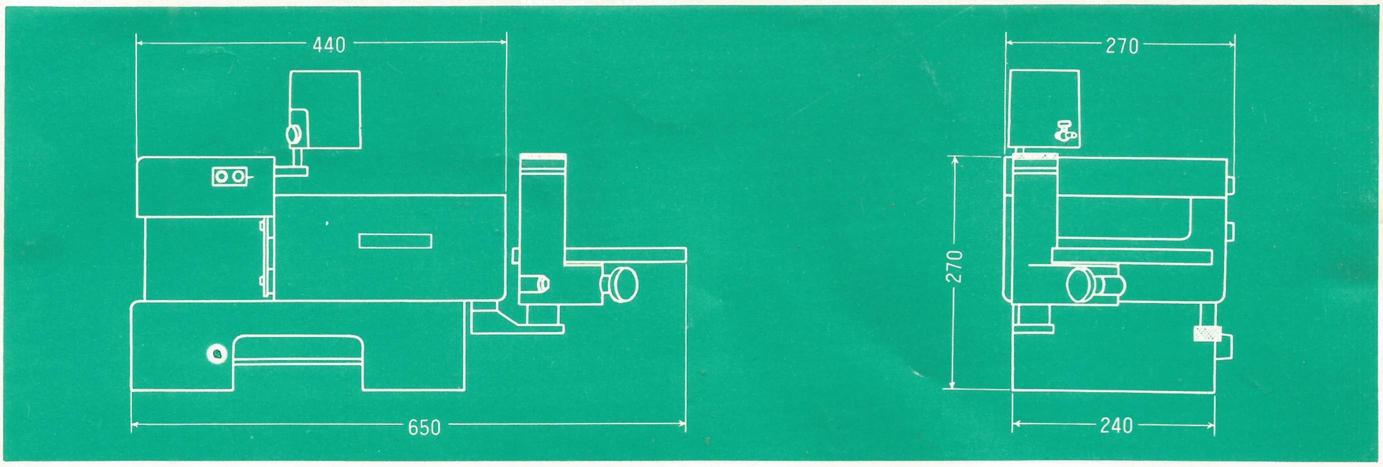
With this facater, the various cabochons -- from round to long and narrow -- can be accurately formed with ideal girdle line and curvature.

Grinding



Lapping and Polishing





SPECIFICATIONS

Length	(26″),	650 mm
Height	(11″),	270 mm
Width	(11″),	270 mm
Spindle speed, 50 cycles		650, 1500 rpm
60 cycles		780, 1800 rpm
Lap diameter	(6″–8″),	150–200 mm
Motor	(¼ HP),	200 watts
Net weight	(51 lbs),	23 kg

STANDARD ACCESSORIES

~~Master lap, Cast iron lap,~~ Set of 12 dop sticks, Transfer block, Dopping wax.

OPTIONAL ACCESSORIES

Lucite lap, Copper lap, Tin lap, Bronze lap, Wood lap, Grinding stone, Index gear 80 & 96, Lamp, Special cam, Trimming attachment, Metal bonded diamond disc.

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TOKYO, JAPAN

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Sylmar, CA 91342
(818) 899-1973

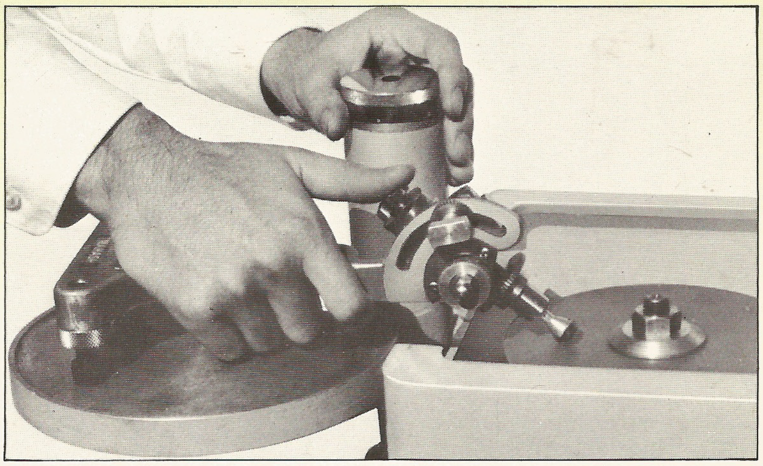
IMAHASHI

FACETER

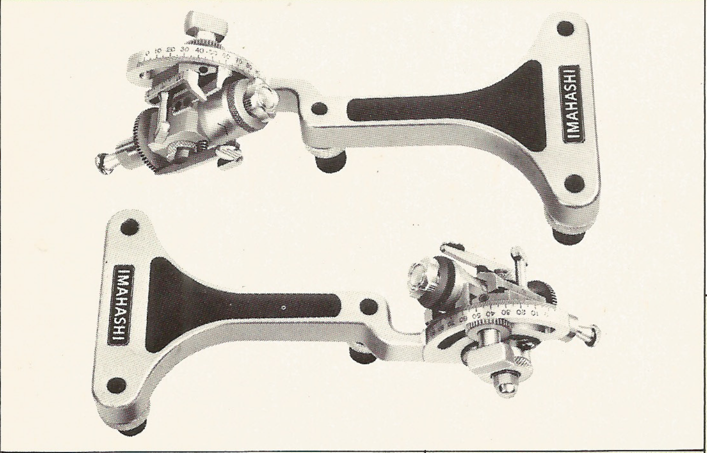
There are three models of Faceter C, P and J available to suit individual requirements.
Our Faceting Unit FAC-8 and Faceting Machine FAC-10 can be used with either of these three faceters.

All faceters consist of a cast aluminum frame with protractor to set the cutting angle, and faceter spindle assembly, made of rust-proof material.
Since these faceters are not connected to the machine, they may quickly be lifted off the table and turned inside out in any position desired to inspect the progress of the work.

Cutting of the table can be easily done without a 45 degree dop stick.



FACETER-C



This Faceter-C is the standard model having replaceable cams.

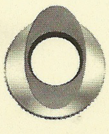
The replaceable cams permit correct preforming of various shapes such as round, oval, marquise etc., from perfectly round to long and narrow.

The cutting angle is automatically determined by the cam from zero to maximum angle.

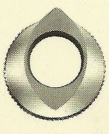
Various cabochons can be accurately formed with this faceter.

By use of cams, you can create or develop entirely new cuts to your own design.

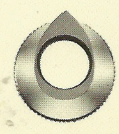
oval cam



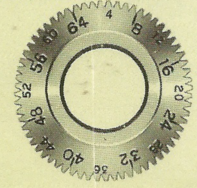
marquise cam

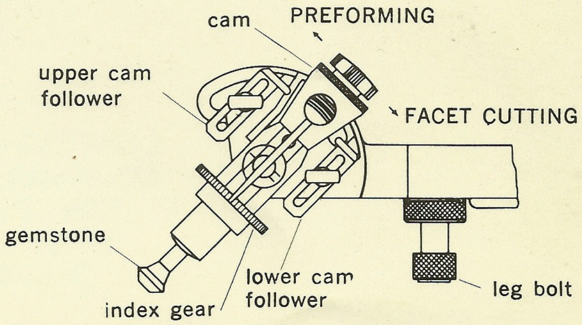


pendeloque cam



Index gear 64, 80 and 96 are mostly used to this faceter.





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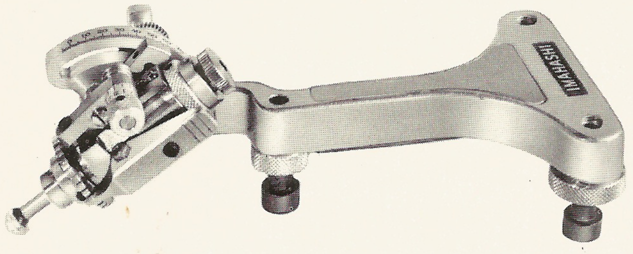
FACETER-P



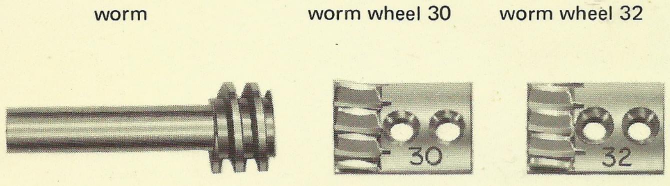
This Faceter-P has a dual indexing devise for super precision dividing.

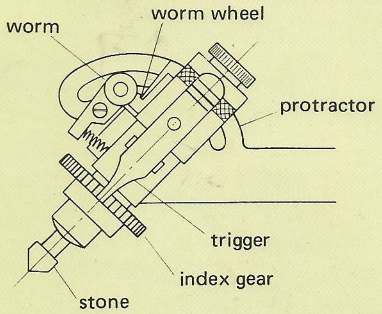
"P" means precision and professional, however it is not only for professional gem cutters, but also for people who desire excellent faceting.
It is especially effective for recutting faceted gemstones.

The rigid trigger is firmly mounted to a hardened steel support and never moves or bends by external force during operation.

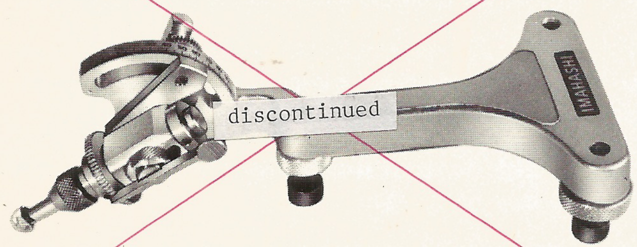
DUAL INDEXING

A good combination of index gear with worm and worm wheel gives the operator many precise divisions.
Index gear 32, worm wheel 32 . . . . minimum division 1/384
Index gear 30, worm wheel 30 . . . . minimum division 1/360





FACETER-J



discontinued

This Faceter-J is of a simplified model suitable for mass production.

The type of collet chuck used on this machine does not require a spanner or wrench for fastening a dop stick.

All index gears are available for this faceter.

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(818) 899-1973

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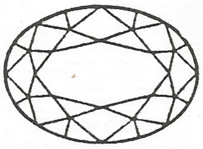
TOKYO, JAPAN

FACETING INSTRUCTIONS

Faceting Unit Model FAC-8
Faceter C, P, UT



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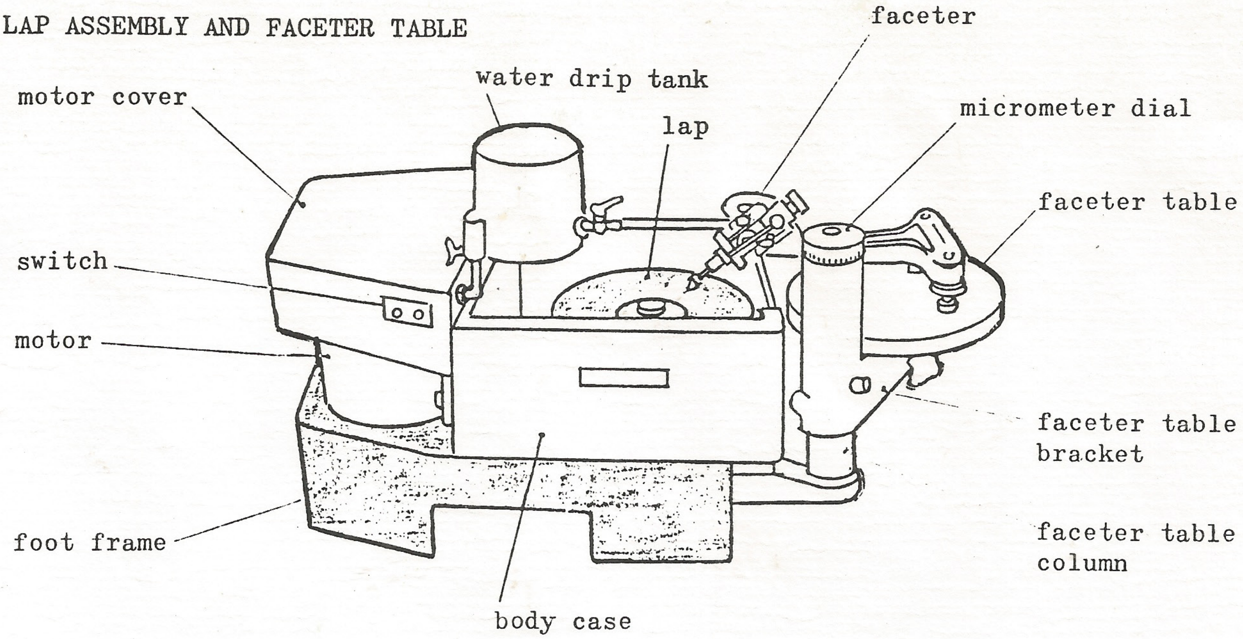
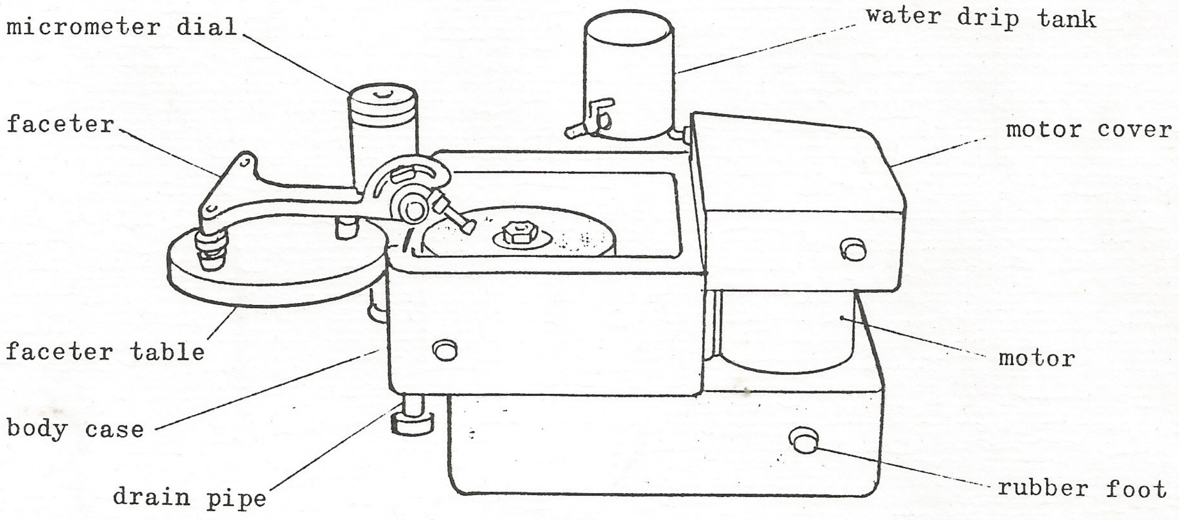
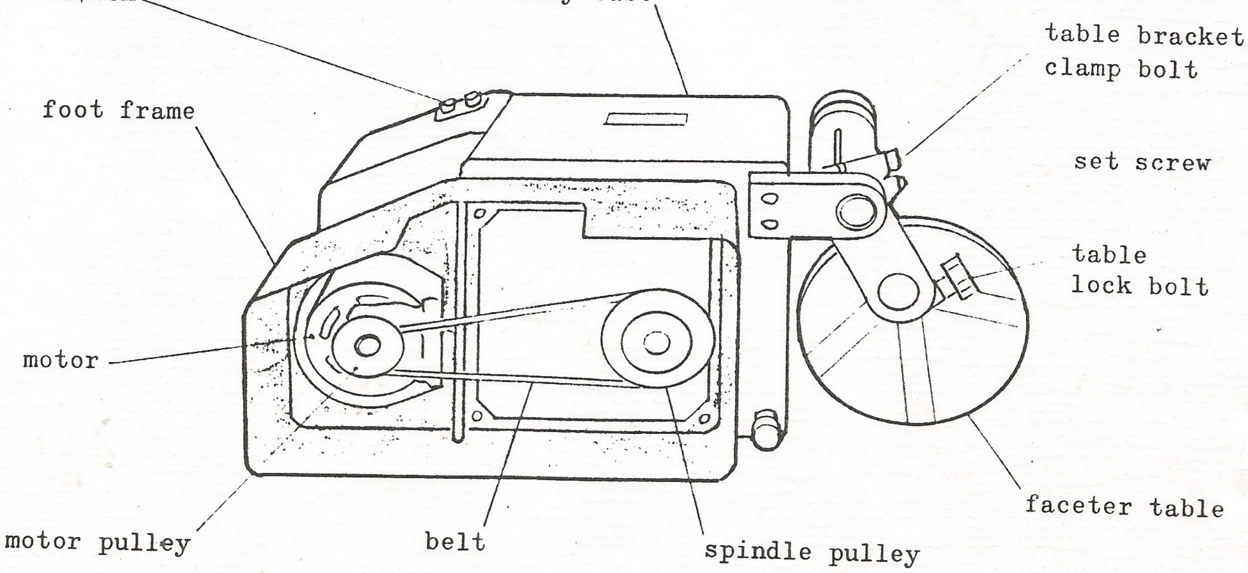
CONSTRUCTION

LAP ASSEMBLY AND FACETER TABLE

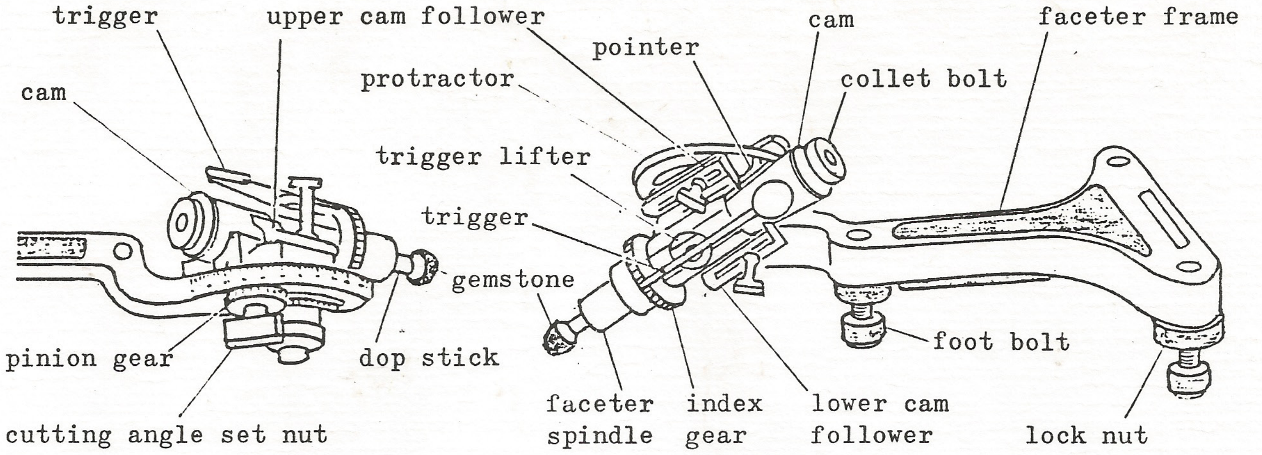


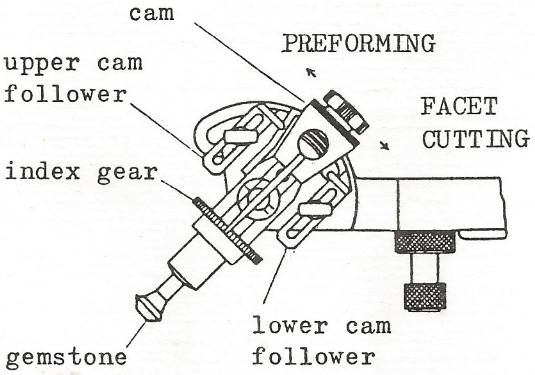


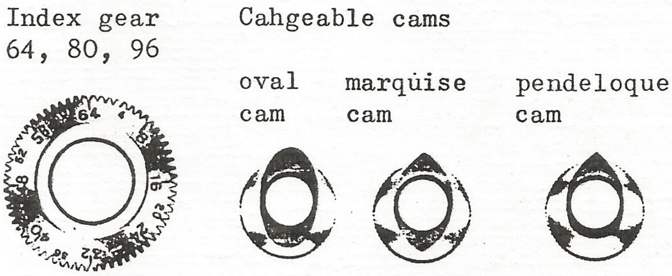


FACETER-C

A standard model having changeable cams. Preforming and faceting of oval, marquise and pendeloque shapes can be easily accomplished with this faceter.



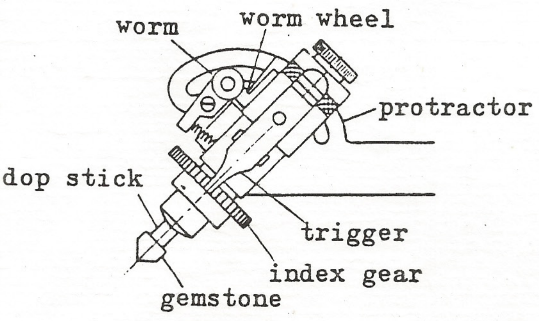


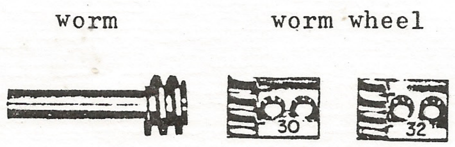


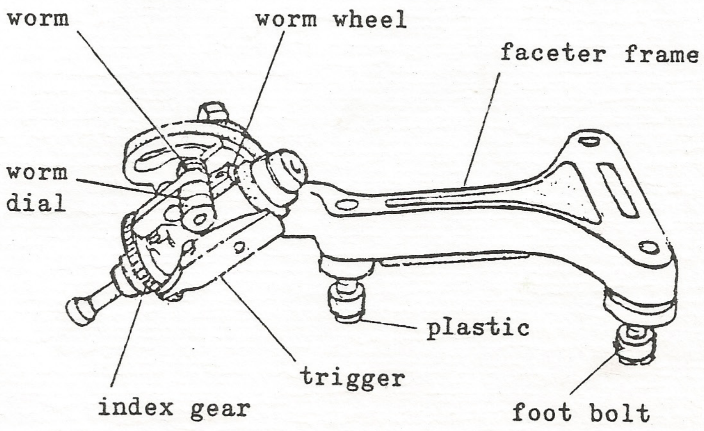
Standard: 64 index gear and oval cam

FACETER-P

A rigid, heavy duty faceter. Dual indexing by worm and worm wheel.
Very useful for recutting. Standard: 30, 32 index gear and 30, 32 worm wheel.



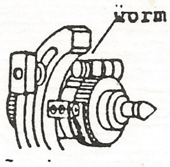




FACETER-UT

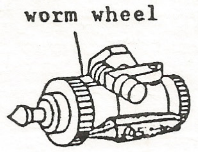
A light, compactly designed faceter. Dual indexing by worm and worm wheel.

Index gear, worm wheel: 30, 32



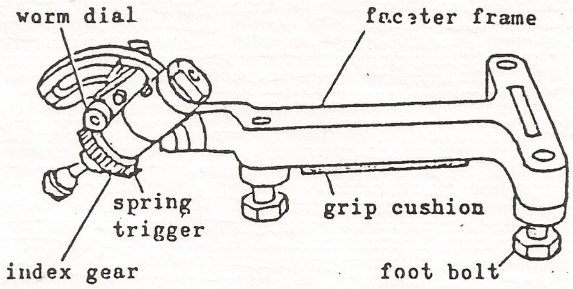
Spring trigger

Thumb-oparated for quick indexing.



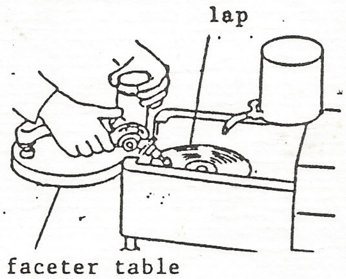
Lever trigger

Accurate and firm indexing.



HOW TO OPERATE THE LAP ASSEMBLY AND FACETERS

FACETING



GIRDLE CUTTING

Set the pointer at 90°

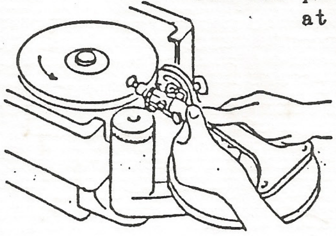
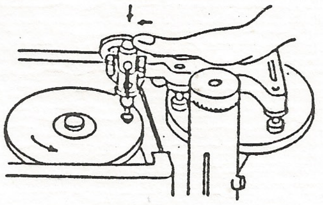


TABLE CUTTING

Set the pointer at 0°



Upper cam follower:
Preforming including cut and polish of the table and girdle

Lower cam follower:
Facet cutting

Set the upper cam follower at 0. Place the pointer at 90° with the cam in contact with the upper cam follower. Disengage the trigger and rotate the cam with left hand fingers. Make sure the cam is always kept in contact with the upper cam follower.

Set the upper cam follower at 0. Place the pointer at 0° with the cam in contact with the upper cam follower. Engage the trigger in index 64 (or 32) and cut the table. Make sure to keep pressing the cam with the thumb to be in contact with the upper cam follower.

Spindle speeds are adjustable by shifting a V-belt in pulley groove.

High speed: Grinding by grinding wheel

Grinding and lapping by diamond disc or diamond wheel

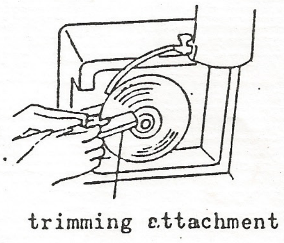
Trimming by diamond saw blade

Low speed: Lapping by cast iron lap with loose abrasive.

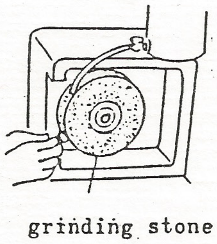
Sanding by coated abrasive disc

Polishing by polishing lap with polishing agent

TRIMMING



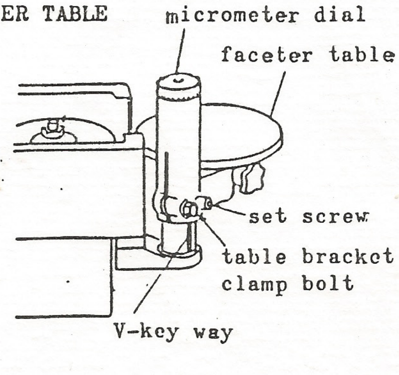
GRINDING

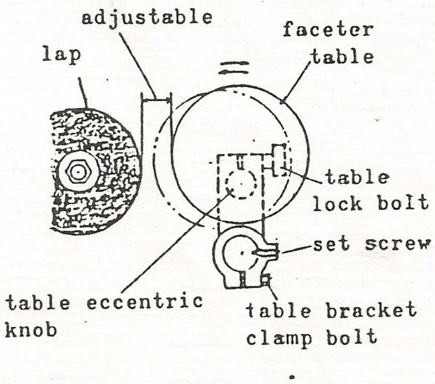


ADJUSTING THE FACETER TABLE

A set screw movably engages with the V-key way.

The faceter table should be adjusted by the table bracket clamp bolt to assure its smooth vertical travel.





DUAL INDEXING APPARATUS

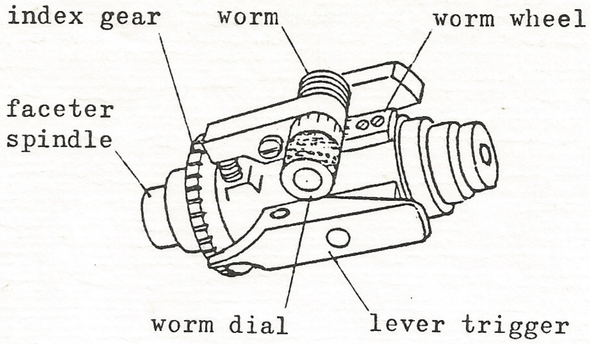
Indexing can be simplified by dual indexing apparatus which eliminates waste of time and fatigue in indexing.

This apparatus incorporates Index Gear, Worm, Worm Wheel, Worm Dial, Spring Trigger or Lever Trigger.

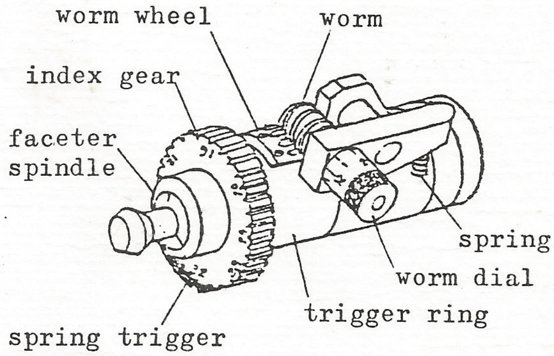
The worm wheel is a part of the gear, and the tooth number of worm wheel and index gear must always be indentical.
The worm wheel and index gear should be changed at the same time.

Variable combinations of index gear, worm and worm wheel permit a great number of divisions of faceter spindle revolution, as shown in the chart.

FACETER - P



FACETER - UT



This table shows combinations of index gear and worm dial to obtain the desired spindle revolution.

Example:

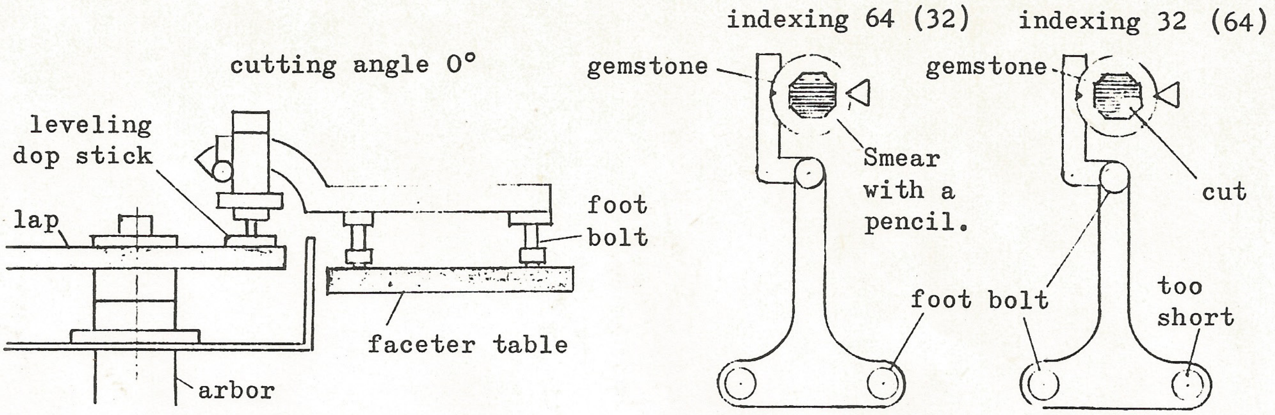
- * One revolution of worm dial makes 1/30 division of the spindle, when index gear 30 and worm wheel 30 are used.
- * Division 64 can be obtained by 6/12=½ revolution of worm dial, when index gear 32 and worm wheel 32 are mounted.
- * Division 96 can be obtained by 4/12 revolution of worm dial, when index gear 32 and worm wheel 32 are mounted.

Any fine adjustment in indexing called "cheating" can also be done by rotating the worm dial less than one graduation.

Spindle revolution	Index gear		Worm dial	
	32	30	32	30
1/2	16/32	15/30		
1/3		10/30		
1/4	8/32			
1/5		6/30		
1/6		5/30		
1/8	4/32			
1/10		3/30		
1/15		2/30		
1/16	2/32			
1/30		1/30		12/12
1/32	1/32		12/12	
1/36				10/12
1/40				9/12
1/45				8/12
1/48			8/12	
1/60				6/12
1/64			6/12	
1/72				5/12
1/90				4/12
1/96			4/12	
1/120				3/12
1/128			3/12	
1/180				2/12
1/192			2/12	
1/360				1/12
1/384			1/12	

LEVEL ADJUSTMENT

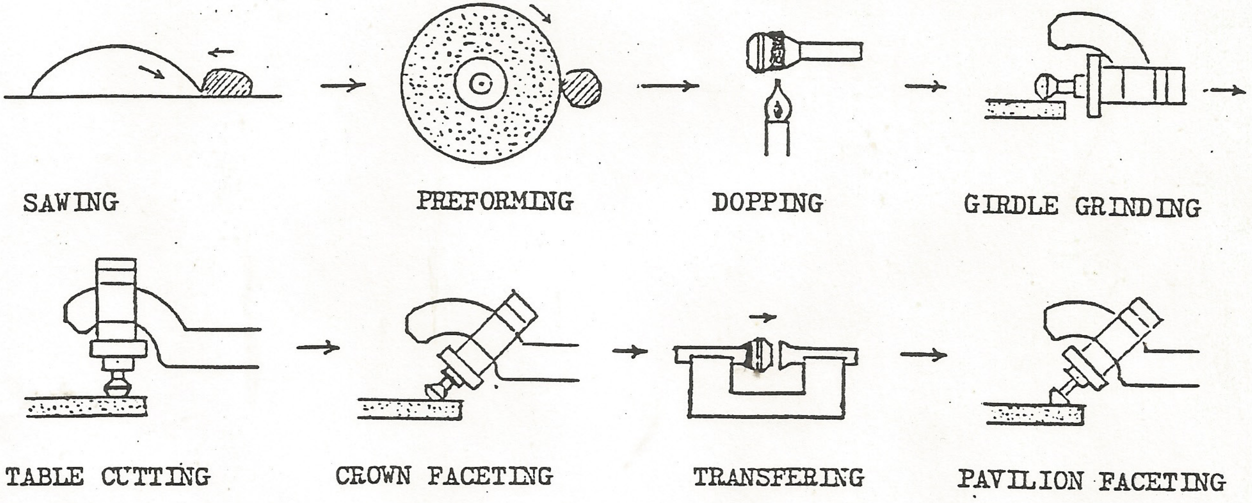
The lap and faceter table should always be parallel each other. When the faceter spindle is set at 0° , it must be exactly perpendicular to the lap surface.



Rough leveling: By foot bolt adjustment using a leveling dop stick

Fine leveling: By foot bolt adjustment in table rough cutting process

PROCESS OF CUTTING



RECOMMENDED SELECTION OF LAPS AND ABRASIVES

Material	Rough grinding	Rought faceting	Fine faceting	Polishing
Quartz	Grinding wheel #100–#220 Diamond disc #100–#260	Carborundum #120–#320 Diamond disc #260–#600	Diamond disc #1200–#1500 Aluminum oxide #800–#1500 on cast iron lap	Cerium oxide or chrome oxide on wood or lucite lap
Corundum	Grinding wheel #100–#220 Diamond disc #100–#260	Diamond disc #260–#600	Diamond disc #1200 – #1500 → Diamond powder 9–15µm on scored copper lap	Diamond powder 1 µm on tin or copper lap

µm = micron

ROUGH CLASSIFICATION OF ABRASIVES

(1) Abrasives for grinding and lapping

(a) Aluminum oxide Al_2O_3 (Synthetic corundum)

Alundum (Norton Co.)	Brown alumina	A
Aloxite (Carborundum Co.)	White alumina .... (White alundum)	WA

(b) Silicon carbide SiC

Carborundum (Carborundum Co.)	Black silicon carbide	C
Crystolon (Norton Co.)	Green silicon carbide .... (Green carborundum)	GC

(c) Boron carbide B_4C, Cubic boron nitride BN and other electric furnace products for lapping hard materials. Cubic boron nitride (Borazon: GE Co.) is the hardest abrasive next to diamond.

(d) Diamond is an ideal abrasive, for it not only surpasses all other substances in hardness, but also has such a feature that can be charged to a metal disc or lap.
Diamond is also used in metal bonded, resin bonded forms, etc.

(2) Abrasives for polishing

(a) Ferric oxide, Fe_2O_3
(b) Cerium oxide, CeO .... Cerox, Lerox, etc.
(c) Zirconium dioxide, ZrO_2 .... Oxicon etc. (seldom used)
(d) Chrom oxide, Cr_2O_3
(e) Aluminum oxide, Al_2O_3 .... Linde A
(f) Tin oxide, SnO_2
(g) Magnesium oxide, MgO (seldom used)
(h) Diamond, C
(i) Tripoli .... Natural polishing agent (seldom used)

INDICATION OF ABRASIVE GRAIN SIZE

Mesh size and Micron size are commonly used to indicate abrasive grain size.

Mesh size means the number of openings of the screen per linear inch through which the grain is sieved.

Micron size usually shows the grit average diameter.

Actually it may be difficult to make the sieve of more than 400 mesh, therefore, the estimated or hypothetical sieve should be used for fine grit abrasive grain.

Micron size is more practical than mesh size to classify fine abrasive.

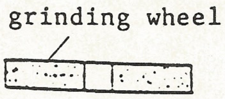
MICRON SIZE versus MESH SIZE

Grade, micron (National Bureau of Standard)	Micron size range	Mesh size equivalent
½	0 - 1	60,000
1	0 - 2	14,000
3	1 - 5	8,000
6	4 - 8	3,000
9	6 - 12	1,800
15	8 - 22	1,200
30	20 - 40	600
45	30 - 60	325
60		280
100		145
120		120
180		80
300		50

CUTTING LAPS

(1) Grinding wheel (Natural and Industrial made)

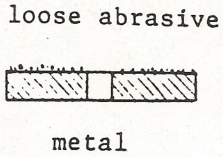
Good surface finish but not efficient



(2) Metal laps using loose abrasive (excluding diamond powder)

Material .... steel, lead, cast iron, plastic etc.
Advantage ...... economical way, good surface finish
Disadvantage ... mess with loose abrasive power

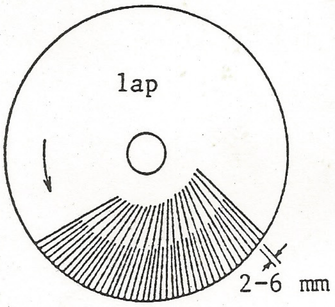
The lead lap is so soft that the abrasive grit can be pressed into it by the stones and be held embedded to cut well.



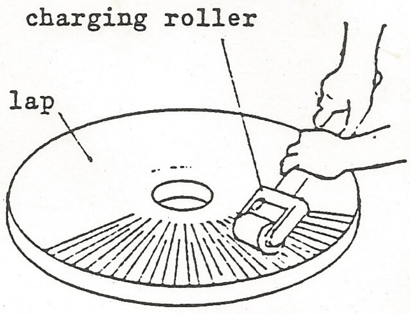
(3) Diamond laps and discs

(a) Copper laps charged with diamond powder

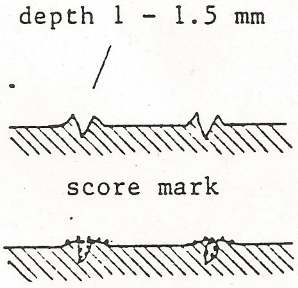
Copper lap with 6 to 9 micron diamond powder is very essential to the final lapping process of corundum group gemstones.



Scoring is made on a metal lap by knife. Copper is used in popular.



Pressing and rolling by a hardened steel roller.



Score mark after being rolled. Diamond powder remains embedded.

The diamond powder is suspended with olive oil and 10 to 20 drops are placed on the lap (diameter 150 - 200 mm). Spread them by fingers for uniform distribution, and press by a charging roller.

(b) Bonded diamond discs

Diamond discs on which diamond powder is firmly bonded are widely used in view of efficiency and economy.

Metal bond diamond disc .... {Sintered ..... expensive, long life
{Plated .... cheap, not long life

Resin bond diamond disc .... not so common but useful

POLISHING LAPS

A polishing lap is used after the final lapping process is finished. Lower lap speed is usually used in polishing than in cutting. Especially for soft stones, lower speed is desirable.

The diamond powder is mixed with vaseline, olive oil or grease. The other polishing agents are mixed with a little water into paste.

Do not apply too much powder onto the lap. Only a small amount of powder is required for polishing.

The recommendable combinations of laps and polishing agents for various gem materials are shown on teh following table.

RECOMMENDED COMBINATIONS OF LAPS AND POLISHING AGENTS

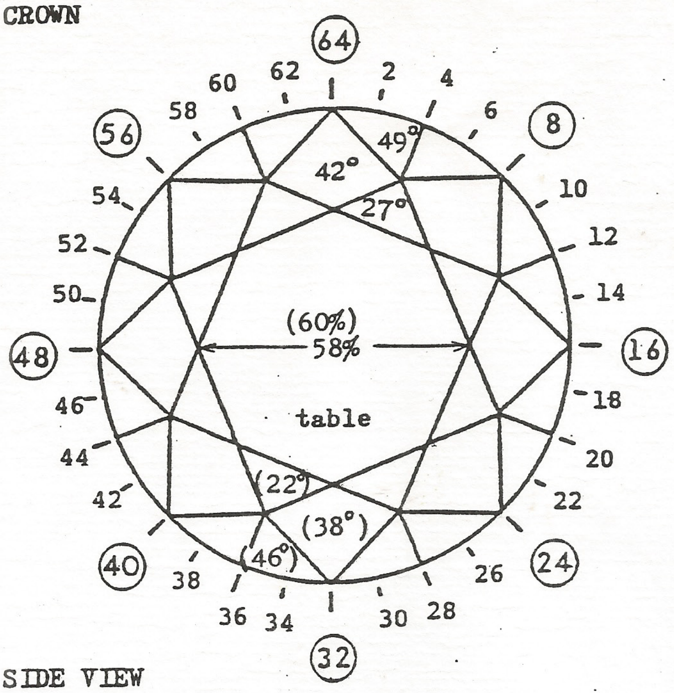
Gemstone	Wood	Wax, Pitch	Lucite	Phenol	Plastic	Cast iron	Tin	Tin-lead	Copper
Andalusite							LA,SnO_2	LA,SnO_2	
Apatite	dia	LA,CeO,SnO_2			LA		LA,SnO_2		
Beryl	dia,LA		LA,CeO,SnO_2		CeO		LA,CeO,SnO_2		
Chrysoberyl				dia			dia,LA	dia	dia,LA
Corundum			dia		dia	dia	dia		dia,TP
Epidote				CeO	CeO		LA,SnO_2	LA,SnO_2	
Feldspar					CeO		LA,CeO	LA,CeO,TP	
Fluorite	dia,LA,SnO_2	LA,SnO_2		CeO	LA,SnO_2			LA,SnO_2	
Garnet					CeO		LA,SnO_2	LA,SnO_2	
Iolite					CeO		LA,SnO_2	LA,SnO_2	
Obsidian	CeO,Cr_2O_3	CeO	CeO				LA,CeO,SnO_2	LA,CeO,SnO_2	
Opal	CeO,SnO_2	CeO,SnO_2	CeO		CeO,SnO_2		LA,SnO_2	LA,SnO_2	
Peridot	dia	LA	LA,CeO	LA			dia,LA,SnO_2	LA	
Quartz	Cr_2O_3 ,Fe_2O_3		CeO,Cr_2O_3	Cr_2O_3	CeO		LA,CeO,SnO_2	LA	
Rutile							dia,LA	LA	
Spinel						dia	dia,LA	LA,Cr_2O_3	dia
Spodumene							LA,SnO_2		
Topaz	dia		LA,Cr_2O_3	dia			dia,LA,SnO_2	LA	dia
Tourmaline			Cr_2O_3		Cr_2O_3		LA,SnO_2	TP	
Zircon						dia	LA,SnO_2	LA,SnO_2	
Cubic zirconia							dia,LA	dia,LA	dia
GGG					dia,CeO		dia,LA,SnO_2	LA,SnO_2	
Srtitanate	dia	LA			dia		dia,LA		
YAG					dia		dia,LA	dia,LA	

dia=diamond powder 1-2 micron, LA=Linde A, TP=tripoli, CeO=cerium oxide, SnO_2=tin oxide, Cr_2O_3=chrome oxide, Fe_2O_3=ferric oxide

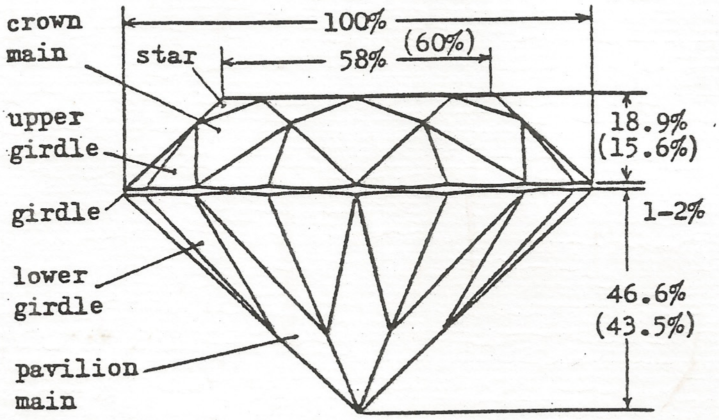
GGG: Gadolinium gallium garnet, YAG: Yttrium aluminum garnet, Sr: Strontium, Glass is the same as obsidian.

STANDARD BRILLIANT, Quartz (Corundum)
(Figures in parentheses are for corundum.)

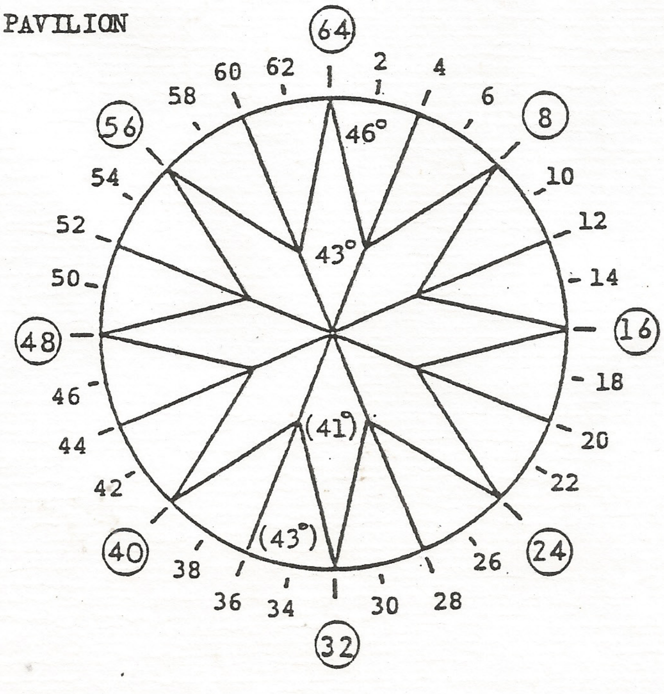
CROWN



SIDE VIEW



PAVILION



FACETING ORDER OF CROWN

1, CUTTING ORDER

a, Girdle cut at 90°

b, Table cut at 0°

c, Crown main facet at 42°(38°)
Index 64-8-16-24-32-40-48-56

d, Star facet at 27°(22°)
Index 4-12-20-28-36-44-52-60

e, Upper girdle facet at 49°± (46°±)
Index 2-6-10-14-18-22-26-30-34-38-42-46-50-54-58-62

The cutting angle of the upper girdle facets will vary slightly from 49°(46°) indicated above, depending on table width.
The larger the table, the greater the upper girdle facet angle.

2, POLISHING ORDER

a, Table

b, Star facet

c, Crown main facet

d, Upper girdle facet

TRANSFERRING

Transfer the gemstone to the another dop stick using a transfer block.

FACETING ORDER OF PAVILION

1, CUTTING ORDER

a, Pavilion main facet at 43° (41°)
Index 64-8-16-24-32-40-48-56

b, Lower girdle facet at 46°(43°)
Index 2-6-10-14-18-22-26-30-34-38-42-46-50-54-58-62

2, POLISHING ORDER

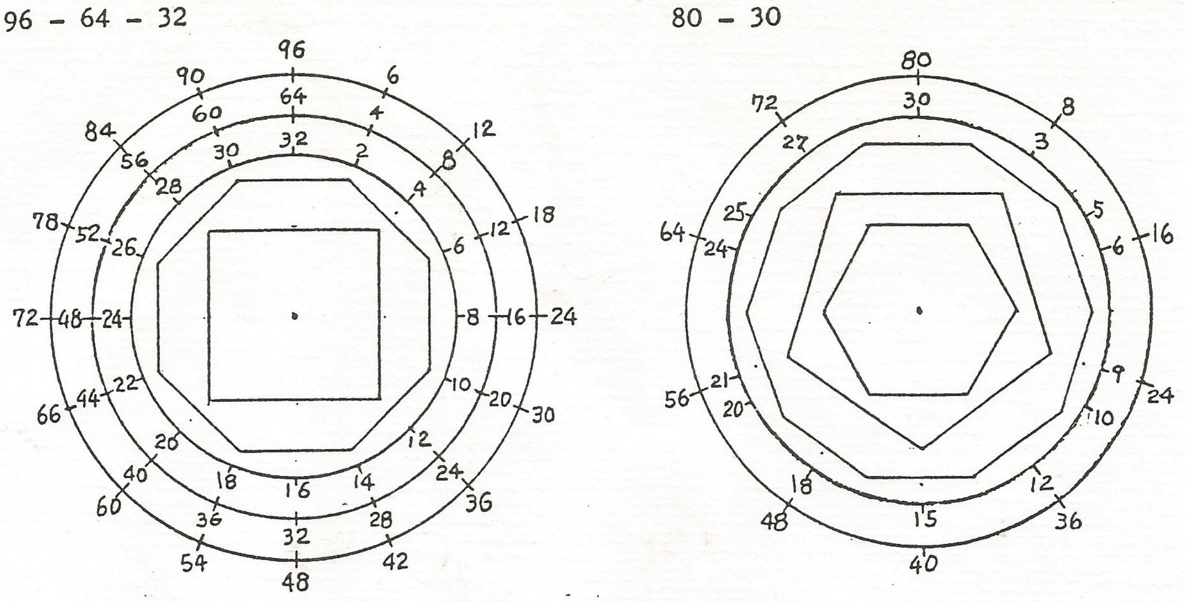
a, Pavilion main facet

b, Lower girdle facet

GIRDLE FINISHING

The girdle is finished either by rotating the faceter spindle keeping the trigger free, or by holding the dop stick with the fingers after removing from the faceter.

CONVERSION CHART showing relative index position for index gear 96,64,32 and 80,30



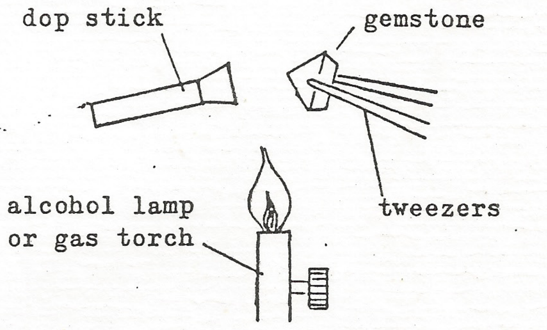
DOPPING

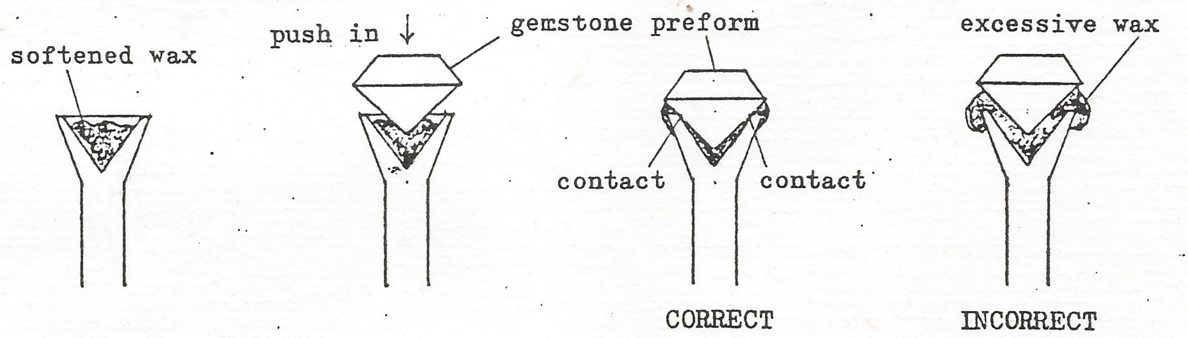
Clean up gemstone and dop stick with alcohol or similar solvent before dopping. Sometimes a little oil or dust fails to get wax sticking.

Gemstone must be preheated and cemented onto the dop stick so that the correct alignment is assured.

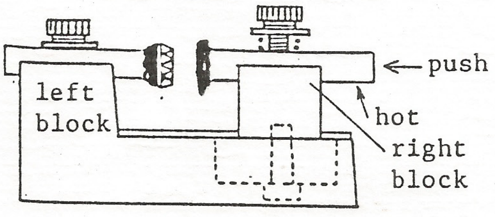
Excessive wax must not be applied to avoid stone moving during faceting.

After the stone is dopped, make sure if it is dopped securely.

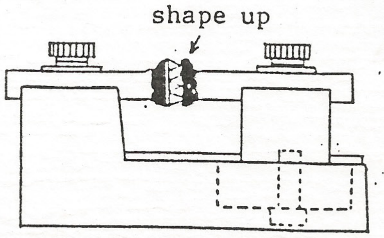




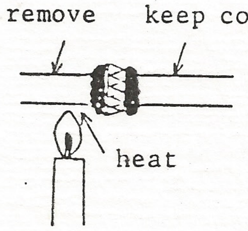
TRANSFERRING by transfer block



Fasten down tightly the stone attached dop on the left block and make sure the stone is nearly centered between the two blocks.
Place the waxed dop on the right block in position.



Reheat the dop and push it in the direction of the stone so that the stone is seated as deeply as possible in the wax.
Be sure to get the crown and pavilion facets in alignment.
Tighten the screw and shape

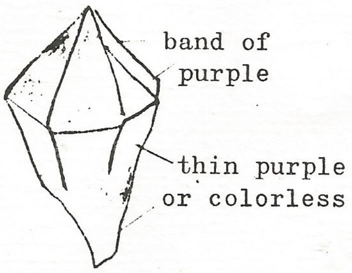


Remove the old do
by reheating.
Clean off wax of
the stone.

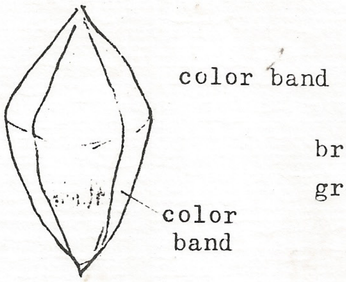
Orientation

In order to get the best advantage, gemstone must be cut in a proper direction. The determination of the direction which is called orientation should be made considering color and cleavage plane.

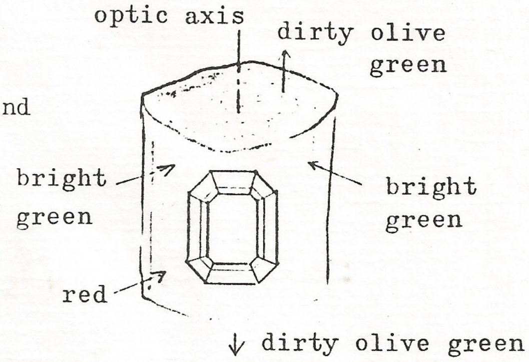
Colors of natural gemstones are not normally uniform and sometimes vary according to the directions to be viewed.
Therefore, gemstones must be properly oriented and cut in order to put the best color face up.



Amethyst

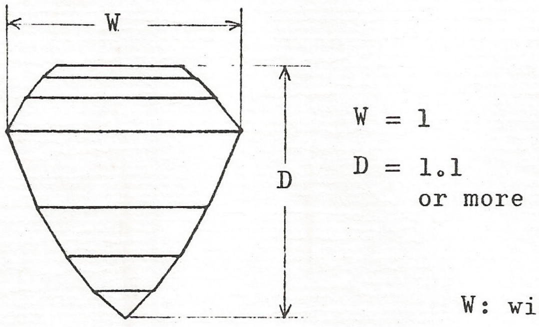


Sapphire

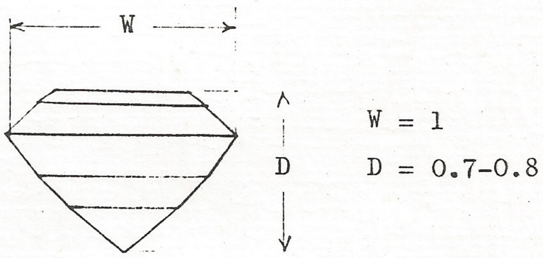


Tourmaline

Deep cut for light color



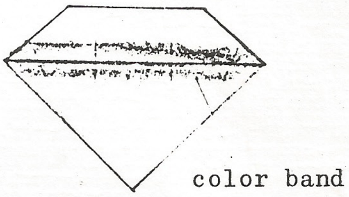
Shallow cut for dark color

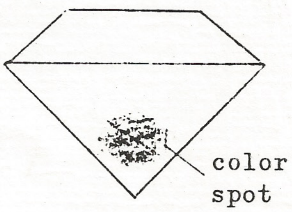


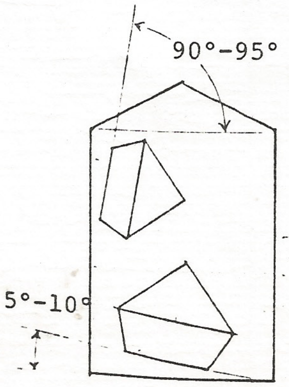
W: width D: depth

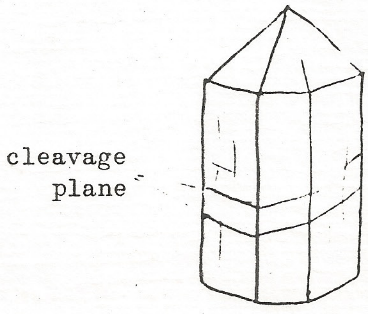
How to place a color zone

It is very often for colored gemstones to appear with color band or color spot. Color band is placed near and parallel to the girdle. Zone of deep color spot is placed near the culet.









If a gemstone has a cleavage plane, it must be oriented 5 to 10 degrees away from the table.

The table should not be cut to parallel to any cleavage planes. This is specially the case when there are two or more cleavage planes.

HOW TO FIND OTHER CUTTING ANGLES

1, Standard Brilliant Cut

CROWN Main facet angle = To be obtained by diagram or table
Star facet angle = Main facet angle − (12° to 17°)
Upper girdle facet angle = Main facet angle + (5° to 9°)

PAVILION Main facet angle = To be obtained by diagram or table
Lower girdle facet angle = Main facet angle + (2° to 3°)

Example:

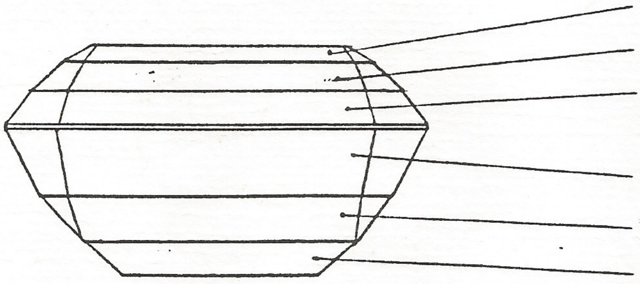
Facet angle	Quartz	Corundum
Crown main facet	42°	38°
Star facet	42° − 15° = 27°	38° − 16° = 22°
Upper girdle facet	42° + 7° = 49°	38° + 8° = 46°
Pavilion main facet	43°	41°
Lower girdle facet	43° + 3° = 46°	41° + 2° = 43°

Note: The star facet angle and upper girdle facet angle vary depending on the table width.

Table width	increase
Star facet angle	decrease
Upper girdle facet angle	increase

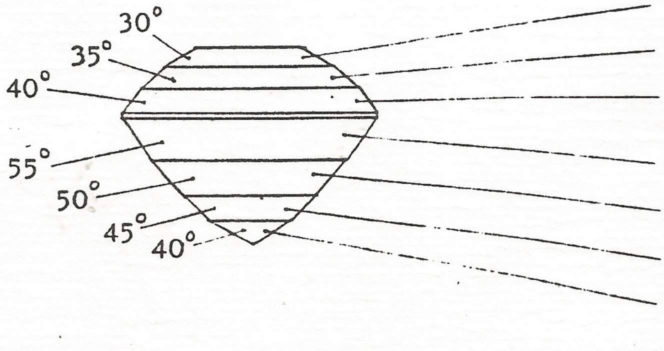
2, Step cut

10° STEPS



	Quartz	Corundum
table bevel facet	32°	28°
crown main facet	42°	38°
upper girdle facet	52°	48°
lower girdle facet	63°	61°
middle facet	53°	51°
pavilion main facet	43°	41°

5° STEPS



	Quartz	Corundum
crown facet, 3	30°	26°
crown facet, 2	35°	31°
crown facet, 1	40°	36°
pavilion facet, 1	55°	53°
pavilion facet, 2	50°	48°
pavilion facet, 3	45°	43°
pavilion facet, 4	40°	38°

TABLE OF FACET ANGLES (1)

Gemstone	Hardness	R.I.	CROWN			PAVILION	
			Main	Star	Girdle	Main	Girdle
Actinolite	5 - 6	1.610-1.640	40	25	45-49	42	44-45
Amber	2 - 2½	1.540	42	27	47-51	43	45-46
Anatase	5½ - 6	2.493-2.554	35	22	40-44	41	43
Andalusite	7 - 7½	1.634-1.643	40	25	45-49	42	44-45
Apatite	5	1.642-1.646	40	25	45-49	42	44-45
Apophyllite	4½ - 5	1.535-1.537	42	27	47-51	43	45-46
Axinite	6½ - 7	1.678-1.688	39	24	44-48	42	44-45
Azurite	3½ - 4	1.73 -1.84	38	23	43-47	41	43-44
Benitoite	6 - 6½	1.757-1.804	37	22	42-46	41	43-44
Beryl	7½ - 8	1.577-1.583	42	27	47-51	43	45-46
Beryllonite	5½ - 6	1.552-1.562	42	27	47-51	43	45-46
Brazilianite	5½	1.602-1.621	41	26	46-50	42	44-45
Calsite	3	1.486-1.658	43	28	43-52	43	45-46
Cassiterite	6 - 7	1.997-2.093	36	21	41-45	41	43
Celestite	3 - 3½	1.622-1.631	40	25	45-49	42	44-45
Chrysoberyl	8½	1.746-1.755	38	23	43-47	41	43-44
Corundum	9	1.762-1.770	38	23	43-47	41	43-44
Crocoite	2½ - 3	2.310-2.660	35	20	40-44	41	43
Danburite	7	1.630-1.636	40	25	45-49	42	44-45
Datolite	5 - 5½	1.626-1.670	40	25	45-49	42	44-45
Diamond	10	2.417	35	22	40-44	41	43
Diopside	5 - 6	1.675-1.701	39	24	44-48	42	44-45
Dioptase	5	1.655-1.708	39	24	44-48	42	44-45
Enstatite	5½	1.658-1.668	39	24	44-48	42	44-45
Epidote	6 - 7	1.729-1.768	38	23	43-47	41	43-44
Euclase	7½	1.654-1.673	39	24	44-48	42	44-45
Feldspar	5 - 7	1.518-1.588	42	27	47-51	43	45-46
Fibrolite	7½	1.658-1.677	39	24	44-48	42	44-45
Fluorite	4	1.434	44	29	49-53	45	47-48
Garnet:							
Almandine	7½	1.786	37	22	42-46	41	43-44
Andradite	6½ - 7	1.875	37	22	42-46	41	43-44
Grossular	7	1.735	38	23	43-47	41	43-44
Pyrope	7 - 7½	1.746	38	23	43-47	41	43-44
Rhodolite	7 - 7½	1.760	38	23	43-47	41	43-44
Spessartite	7 - 7½	1.794	37	22	42-46	41	43-44
Uvarovite	7½	1.870	37	22	42-46	41	43-44
Glass	5 - 6	1.48 -1.70	43	28	48-52	44	46-47
Hambergite	7½	1.555-1.625	42	27	47-51	43	45-46
Idocrase	5½ - 6½	1.713-1.718	38	23	43-47	41	43-44
Iolite	7 - 7½	1.542-1.551	42	27	47-51	43	45-46
Jade	6 - 7	1.606-1.667	40	25	45-49	42	44-45
Kornerupine	6	1.667-1.680	39	24	44-48	42	44-45
Kyanite	4 - 7	1.716-1.731	38	23	43-47		
Lazulite	5 - 6	1.612-1.643	40	25	45-49	42	44-45
Obsidian	5 - 5½	1.500	43	28	43-52	44	46-47
Opal	5 - 6½	1.45	44	29	49-53	45	47-48

TABLE OF FACET ANGLES (2)

Gemstone	Hardness	R.I.	CROWN Main	CROWN Star	CROWN Girdle	PAVILION Main	PAVILION Girdle
Peridot	6½ - 7	1.654-1.690	39	24	44-48	42	44-45
Phenakite	7½ - 8	1.654-1.670	39	24	44-48	42	44-45
Prehnite	6 - 6½	1.615-1.646	40	25	45-49	42	44-45
Quartz	7	1.544-1.553	42	27	47-51	43	45-46
Rhodochrosite	3½ - 4½	1.597-1.817	40	25	45-49	42	44-45
Rhodonite	5½ - 6½	1.73 -1.74	38	23	43-47	41	43-44
Rutile	6 - 6½	2.616-2.903	34	19	39-43	41	43-44
Scapolite	6 - 6½	1.55 -1.572	42	27	47-51	43	45-46
Sinhalite	6 - 7	1.668-1.707	39	24	44-48	42	46-47
Sodalite	5 - 6	1.483	43	28	43-52	44	46-47
Sphalerite	3½ - 4	2.37	35	20	40-44	41	43
Spherne	5 - 5½	1.900-2.034	36	21	41-45	41	43
Spinel	8	1.718	38	23	43-47	41	43-44
Spodumene	6 - 7	1.660-1.676	39	24	44-48	42	44-45
Topaz	8	1.619-1.627	40	25	45-49	42	44-45
Tourmaline	7 - 7½	1.624-1.644	40	25	45-49	42	44-45
Willemite	5½	1,69 -1.72	39	24	44-48	42	44-45
Zircon, low	6½	1.810-1.815	37	22	42-46	41	43-44
Zircon, high	7½	1.925-1.984	36	21	41-45	41	43-44
SYNTHETIC GEMS							
Alexandrite	8½	1.747-1.756	38	23	43-47	41	43-44
Corundum	9	1.762-1.770	38	23	43-47	41	43-44
Cubic zironia	7½ - 8½	2.150-2.180	35	20	40-44	41	43
Emerald, Chatham	7½ - 8	1.560-1.563	42	27	47-51	43	45-46
Gilson	7½ - 8	1.560-1.563	42	27	47-51	43	45-46
Regency	7½ - 8	1.568-1.573	42	27	47-51	43	45-46
GGG	6½ - 7	2.02	36	21	41-45	41	43
Lithium niobate	5½	2.210-2.300	35	20	40-44	41	43
Lithium tantalate	5½ - 6	2.22	35	20	40-44	41	43
Opal, Gilson	5½ - 6½	1.44 -1.45	44	29	49-53	45	47-48
Quartz	7	1.544-1.553	42	27	47-51	43	45-46
Spinel	8	1.726	38	23	43-47	41	43-44
Strontium titanate	5 - 6	2.409	35	20	40-44	41	43
YAG	8 - 8½	1.833	37	22	42-46	41	43-44
Yttrium alminate	8	1.938-1.955	36	21	41-45	41	43-44

Beryl: Aquamarine, Emerald, Goshenite, Heliodor, Morganite, Yellow beryl

Chrysoberyl: Alexandrite, Cat's eye, Chrysoberyl

Corundum: Ruby, Sapphire

Jade: Chloromelanite, Jadeite, Nephrite

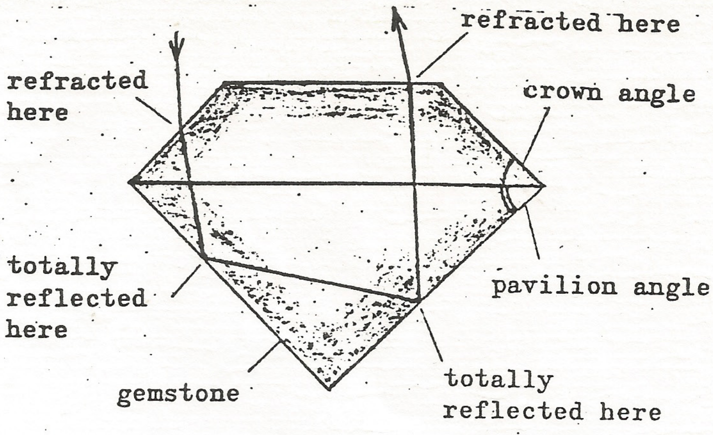
Quartz: Amethyst, Blue quartz, Citrine, Green quartz, Rock crystal, Rose quartz, Smoky quartz

Spodumene: Hiddenite, Kunzite, Spodumene

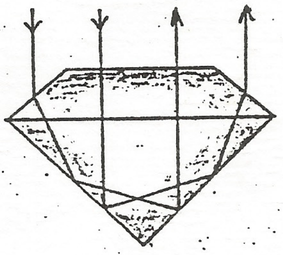
CUTTING ANGLES AND PROPORTIONS

The most desirable brilliancy of faceted gemstones is only obtained by cutting them into the good proportions, correct cutting angles and superior surface finish.

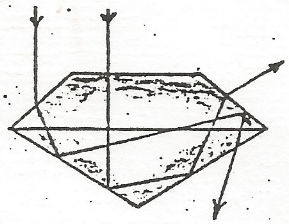
The lower facets when cut at proper angles, act as mirrors and reflect the entering light almost completely, making the gemstones brilliant.



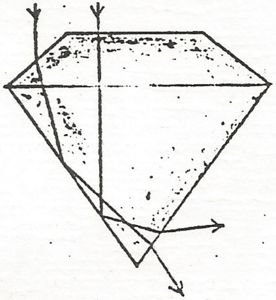
ideal cut



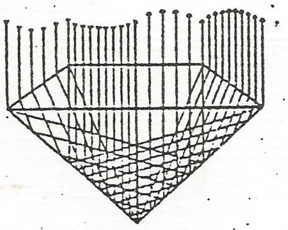
too shallow



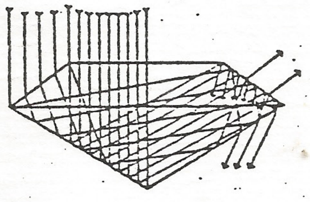
too deep



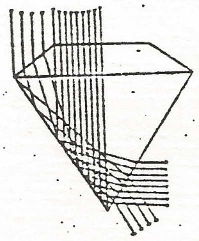
ideal cut



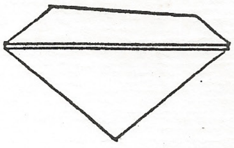
too shallow



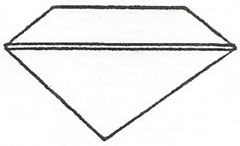
too deep



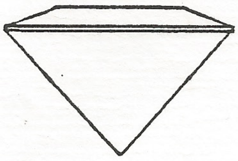
Incorrect cutting proportions



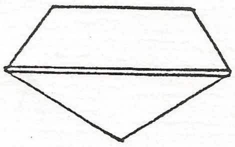
sloping table



out-of-center



thin crown with overdepth pavilion



deep crown with shallow pavilion

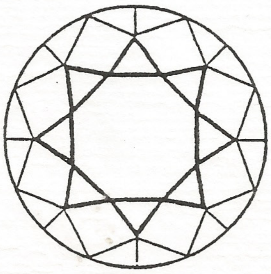


table 48%

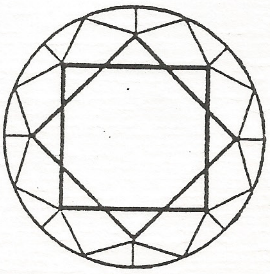


table 58%

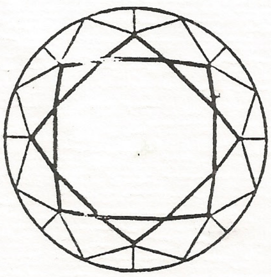
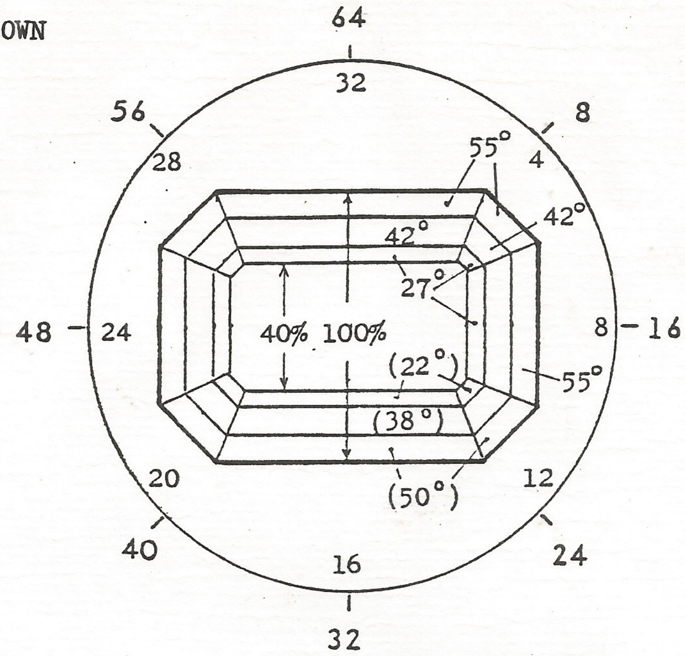


table 65%

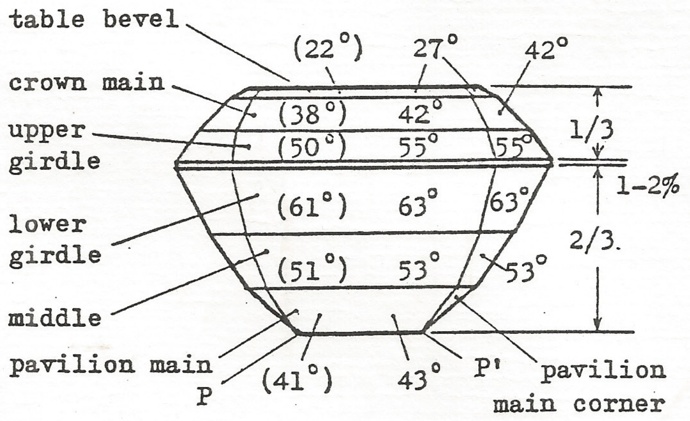
EMERALD CUT, Quartz (Corundum)

(Figures in parentheses are for corundum.)

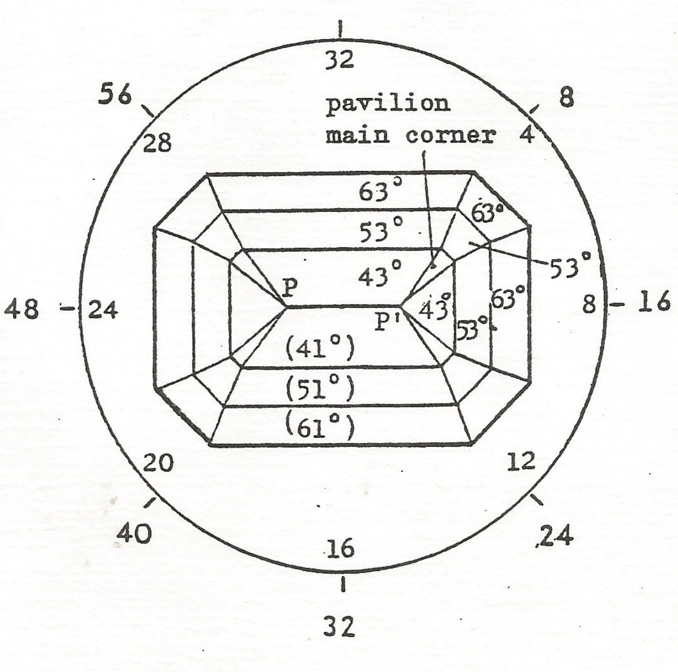
CROWN



SIDE VIEW



PAVILION



FACETING ORDER OF CROWN

1, CUTTING ORDER

a, Girdle at 90°
Index 64-32 16-48 8-24-40-56

b, Table at 0°
Index 64 or 32°

c, Crown main facet at 42°(38°)
Index 64-32 16-48
8-24-40-56 corner

d, Table bevel facet at 27°(22°)
Index 64-32 16-48
8-24-40-56 corner

e, Upper girdle facet at 55°(50°)
Index 64-32 16-48
8-24-40-56 corner

2, POLISHING ORDER

a, Table
b, Table bevel facet
c, Crown main facet
d, Upper girdle facet

TRANSFERRING

FACETING ORDER OF PAVILION

1, CUTTING ORDER

a, Lower girdle facet at 63°(61°)
Index 64-32 16-48
8-24-40-56 corner

Check to see if parallel to the girdle line, otherwise correction is required.

b, Middle facet at 53°(51°)
Index 64-32 16-48
8-24-40-56 corner

c, Pavilion main facet at 43°(41°)
Index 64-32 16-48
8-24-40-56 corner

But, at the pavilion main corner facet, the cutting angle must be set so that the edges meet at the point "P" and "P'".

2, POLISHING ORDER

a, Pavilion main facet
b, Middle facet
c, Lower girdle facet

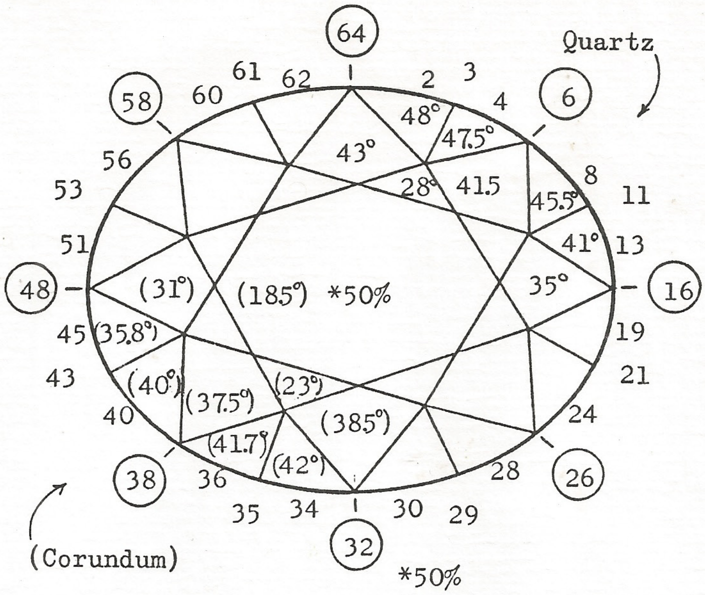
GIRDLE FINISHING

Same method as for standard brilliant cut.

BRILLIANT OVAL, Quartz (Corundum)

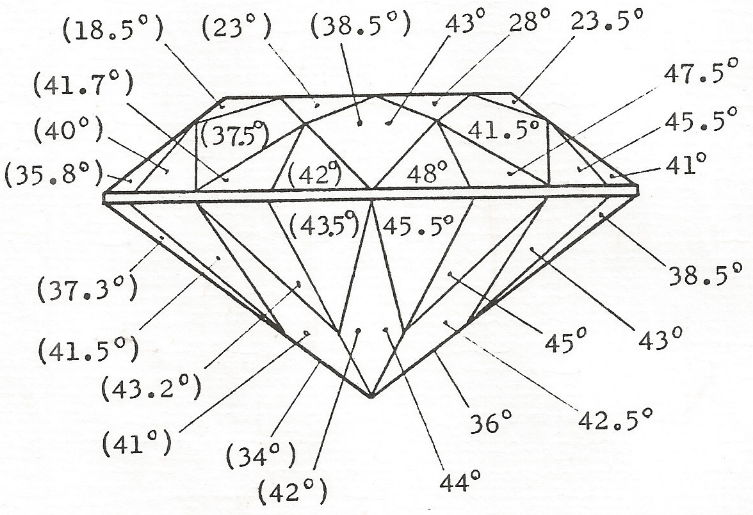
(Figues in parentheses are for corundum.)

CROWN

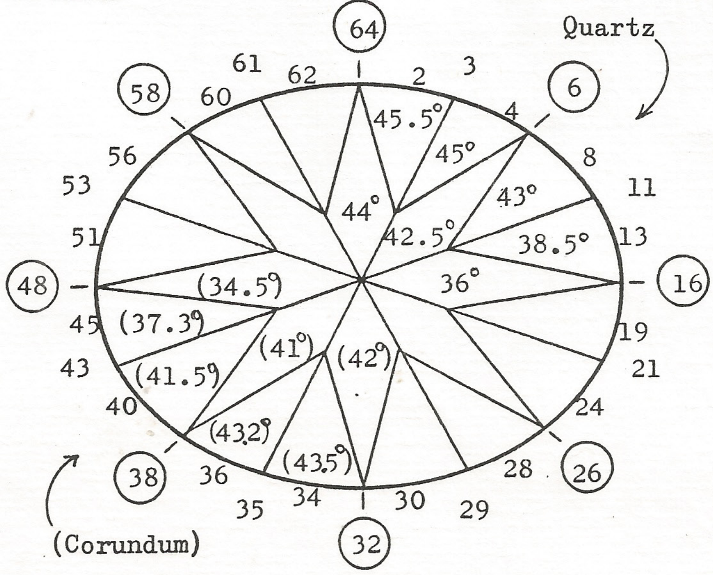


*50%
Minor axis B = 100%

SIDE VIEW

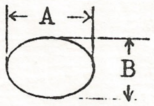


PAVILION



The cutting angles given below are based on an ellipse whose major axis and minor axis are in a ratio of 4/3.

$$\frac{\text{major axis A}}{\text{minor axis B}} = \frac{4}{3}$$



FACETING ORDER OF CROWN

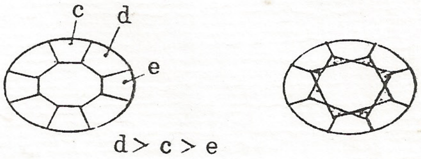
1, CUTTING ORDER

a, Girdle cut at 90°

b, Table at 0°

c, Crown main facet

Index
43° (38.5°): 64-32
41.5° (37.5°): 6-26-38-56
35° (31°): 16-48



d > c > e

d, Star facet

28° (23°): 3-61-29-35
23.5° (18.5°): 11-21-43-53

e, Upper girdle facet

48°± (42°±): 2-62-30-34
47.5°±(41.7°±): 4-28-36-60
45.5°±(40°±): 8-24-40-56
41°± (35.8°±): 13-19-45-51

2, POLISHING ORDER

Table - Star facet - Crown main facet - Upper girdle facet

TRANSFERRING

FACETING ORDER OF PAVILION

1, CUTTING ORDER

a, Pavilion main facet

44° (42°): 64-32
42.5° (41°): 6-26-38-58
36° (34.5°): 16-48

b, Lower girdle facet

45.5° (43.5°): 2-62-30-34
45° (43.2°): 4-28-36-60
43° (41.5°): 8-24-40-56
38.5° (37.3°): 13-19-45-51

2, POLISHING ORDER

Pavilion main facet - Lower girdle facet

GIRDLE FINISHING

FACETING A BRILLIANT OVAL USING FACETER-C

The Imahashi FACETER-C simplifies the cutting of oval, marquise and pendeloque shapes with the use of interchangeable cams.

How does the use of the FACETER-C differ from the presently used techniques?

(1) Preforming including girdle cutting can be done with this faceter, using no other equipment.
(2) A change of cutting angle is automatically obtained by the cams.
(3) Table cut can be made without using 45-degree dop stick.

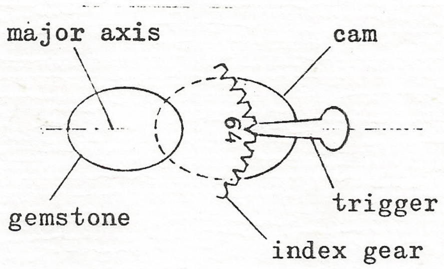
In the past, oval, marquise and pendeloque shapes presented the faceter with the difficult problem of cutting angle determination for almost all the facets. Therefore, all these shapes were cut by guesswork, and it took months and even years to develop the skill to cut facets with good meets.

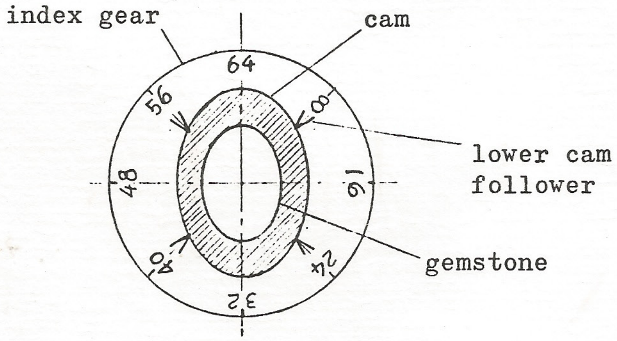
With the use of the FACETER-C, all this training and quesswork are made unnecessary. The cam makes it possible for a beginner, with a little practice, to cut difficult shapes with relative easy in any size or ratio of stones.

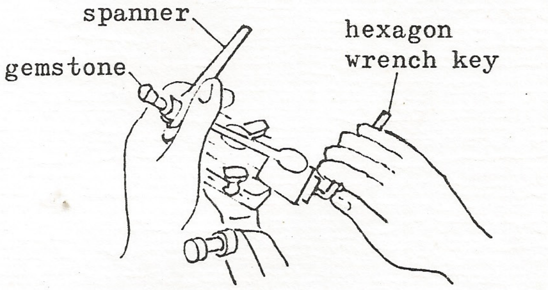
1, Alignment

Insert the oval cam onto the rear of the spindle. Place the cam so that the major axis of the cam lines up the 64 index tooth. Install the dopped, rough preformed gemstone into the collet chuck.

Align the stone by eye so that the major axis of the stone lines up as closely as possible with the 64 index tooth.







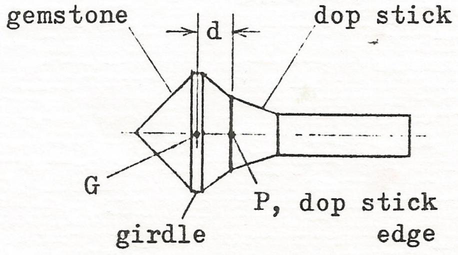
Now to test the alignment, set the lower cam follower to 10. Keeping the lower cam follower in contact with the cam, rotate the index to 8, 24, 40, 56. The cutting angles indicated on the protractor at these four indexing positions should be the same. If not, minor adjustments must be made to the cam setting, either slightly to the right or to the left, until all cutting angles at 8, 24, 40, 56 have the same value. Alignment is now complete.

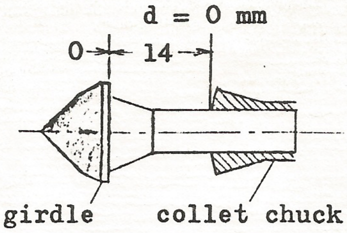
2, Girdle cutting

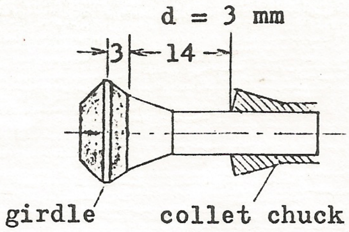
The upper cam follower (UCF) is used to preform, cut and polish the girdle. To set the UCF to the correct position, the following steps must be taken.

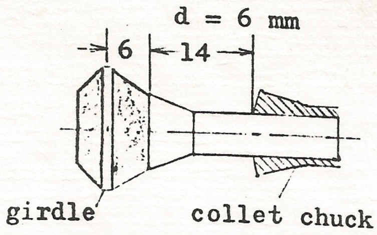
First measure the major and minor axis of the stone to be cut, in millimeters. Then measure the distance "d" as shown in figure.

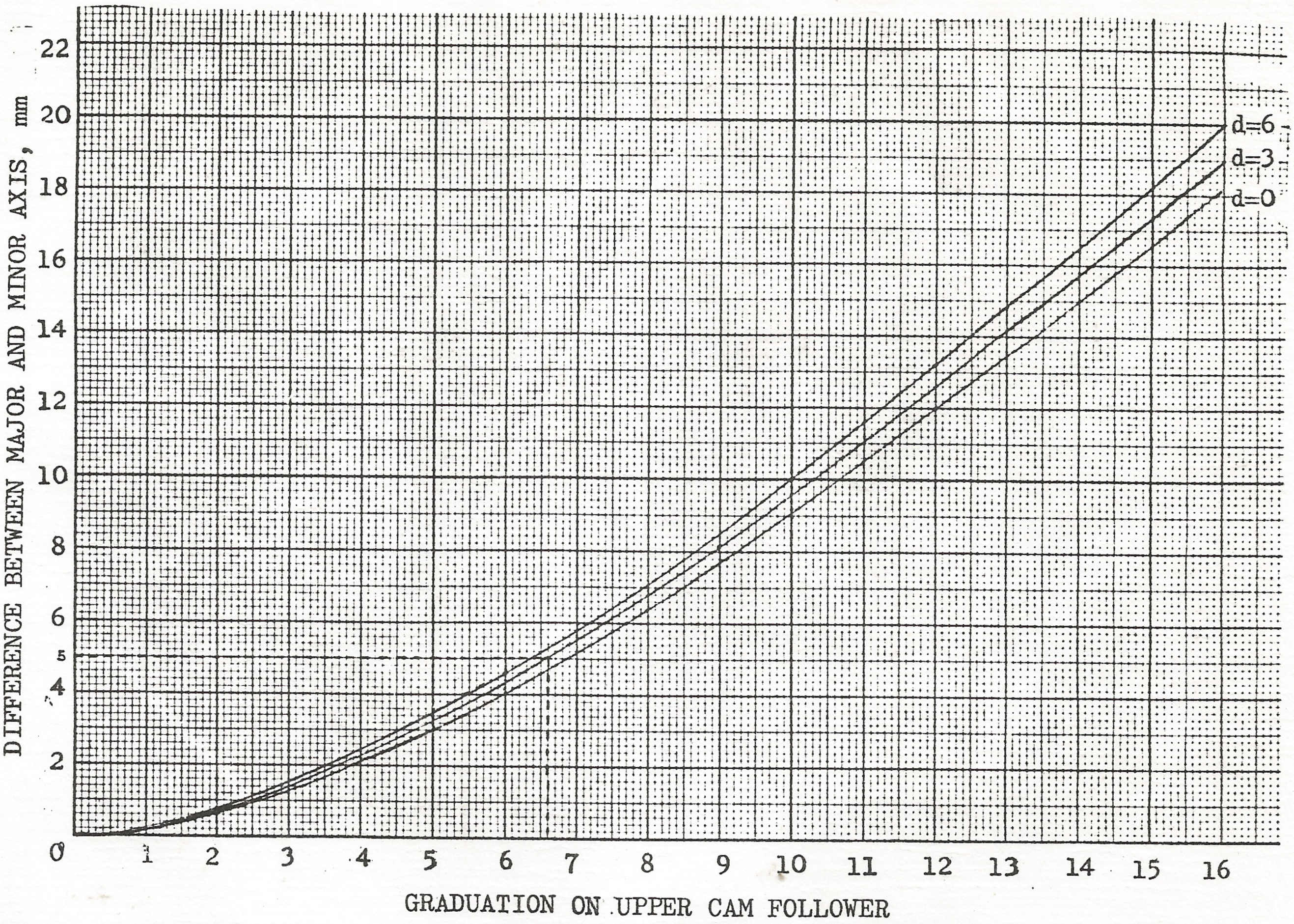
With these two values, go to chart to find the approximate UCF value. For intermediate values of d such as 1.5, 2.7 mm, the operator must interpolate.







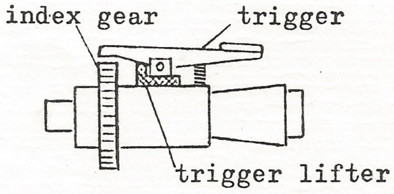




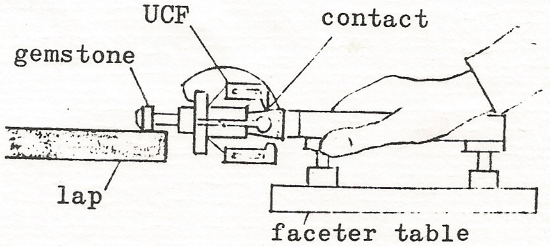
For example, in case of forming a 13x18 mm oval, the difference between the major and minor axis is 5 mm, d is measured to be 3 mm.
From the chart, graduation on UCF arrives at 6.6. Set the UCF at 6.6, then the girdle of gemstone can be ground 13 x 18 mm.

Keep in mind that the UCF setting found is most likely approximate, but nevertheless very close to the correct setting. Minor adjustments may be required later on.

Set the UCF to the value found.
Set the index gear at 8, 24, 40, 56.
At any of these 4 index teeth, set the cutting angle at 90° while holding the UCF in contact with the cam. Free the trigger by turning the knurled trigger lifter so that the entire unit of the stone, spindle, index gear and cam can spin freely.



Place the faceter on the faceter table and cut the girdle by turning the faceter spindle holding the knurled cam end with fingers.
The UCF must be kept in contact with the cam as shown in figure.

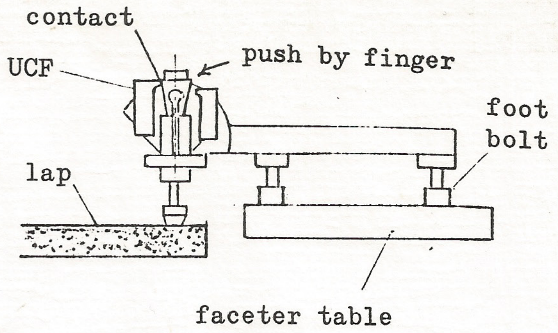


3, Table cutting

Set the UCF at 0°
Indexing: 64, 32
Cutting angle: 0°

Adjust the faceter level by three foot bolts to acquire a complete perpen-dicularity of the faceter spindle against the lap surface. Refer to LEVEL ADJUSTMENT on page 5.

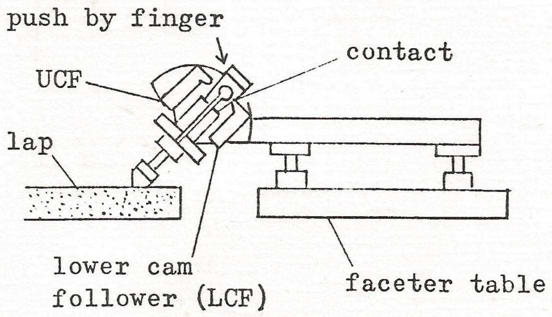
Cut the table using 120-600 grit for rough cutting and 800-1500 grit for fine cutting.



The recommendable table width is about 60% of the girdle width. Hold the faceter spindle by finger so that the cam is always in contact with the UCF.

4, Faceting the crown main facets

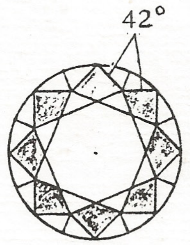
Unlike the standard brilliant cut, the adjoining facet has the different cutting angle.
It is difficult to get the ideal cutting angles.
But, use of the cam and the lower cam follower (LCF) makes it possible for a operator to set the cutting angles automatically.

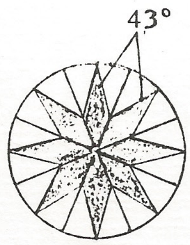


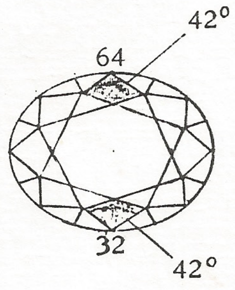
To find the correct LCF setting, first determine the correct main cutting angle for the stone to be cut.

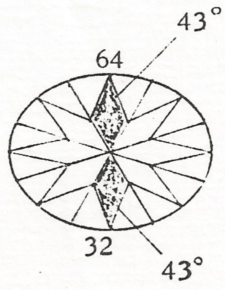
From TABLE OF FACET ANGLES on page 14, the cutting angles of standard brilliant cut for quartz are as follows:

Crown main facet is 42° and pavilion main facet is 43°. These cutting angles are normally used to cut the main facets on minor axis of the oval shape.





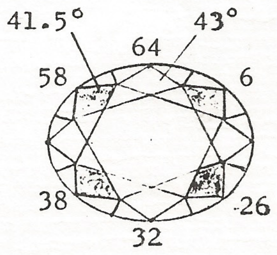


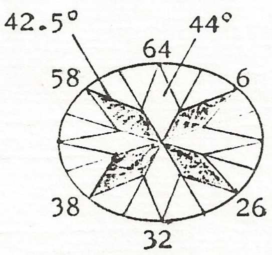


To increase more brilliancy, a modification is made.

Crown main facets index 64, 32 ------ 43°
Pavilion main facets index 64, 32---- 44°

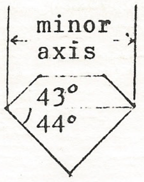
Accordingly, crown main facets index 6, 26, 38, 58 are set at 41.5° by the cam, and pavilion main facets index 6, 26, 38, 58 are also set at 42.5°.

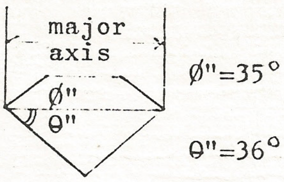




This will result in eight adjacent crown and pavilion main facets releasing more of the stone's potential brilliance.

In order that the pavilion main facets indexing 64 and 16 may meet at one point, the pavilion main facet angle indexing 16 is given as follows:





$$\tan\theta'' = \frac{3}{4}\tan 44^\circ = 0.7243$$

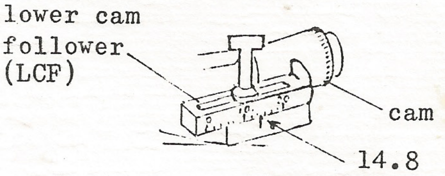
thus θ'' is about 36° and $44^\circ - 36^\circ = 8^\circ$

then the crown main facet angles indexing 64 and 16 will be 43° and 35°. The further details will be explained later. (page 23)

DIFFERENCE BETWEEN CUTTING ANGLES INDEXING 64 AND 16, degree

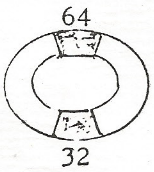
1	2	3	4	5	6	7	8	9	10	11	12	13	14
3.5	5.5	7.3	9.0	10.6	12.2	13.6	14.8	16.0	17.0	18.0	19.0	20.0	20.8

GRADUATION ON LOWER CAM FOLLOWER

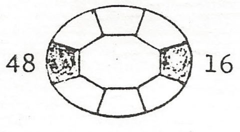


From the table, the value 14.8 is obtained for 8° difference.

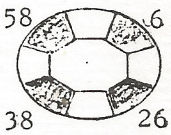
With the LCF set at 14.8, engage the trigger 64 and set the pointer at 43° keeping the lower cam follower in contact with the cam. Change the trigger to 16, and the cutting angle will be 35°.
If a slight difference is found, correct the cutting angle by resetting the lower cam follower. Once correct setting is made, the optimum cutting angles at any indexing are automatically obtained.
Never change the lower cam follower position until all faceting and polishing are finished.



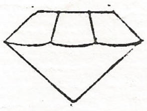
cutting angle 43°



cutting angle 35°



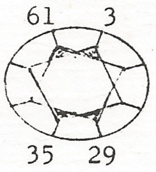
cutting angle 41.5°



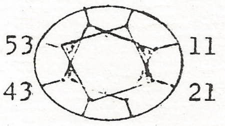
Girdle line must be straight.

5, Faceting the star facets

Set the cutting angle 28° at indexing 3, and cutting angle 23.5° at indexing 11 is automatically obtained by the cam.



cutting angle 28°



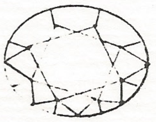
cutting angle 23.5°

6, Faceting the upper girdle facets

4 facets	48°	at indexing	2,30,34,62
4 facets	47.5°	at indexing	4,28,36,60
4 facets	45.5°	at indexing	8,24,40,56
4 facets	41°	at indexing	13,19,45,51

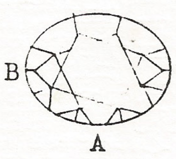
The cutting angles vary as the size of the table. All cutting angles are automatically set by the cam.

CORRECT



meet in one point on the girdle line.

INCORRECT



A: too small cutting angle
B: too large angle or over cutting

7, Polishing the table, star, crown main and upper girdle facets

The polishing is done in the same procedure as cutting using the same cutting angle and indexes. The polishing order is as follows:

Table - Star facets - Crown main facets - Upper girdle facets

NOTE: Use lower lap speeds.
Too much polishing powder is wasteful and causes imperfect surfaces.

8, Transfer the stone

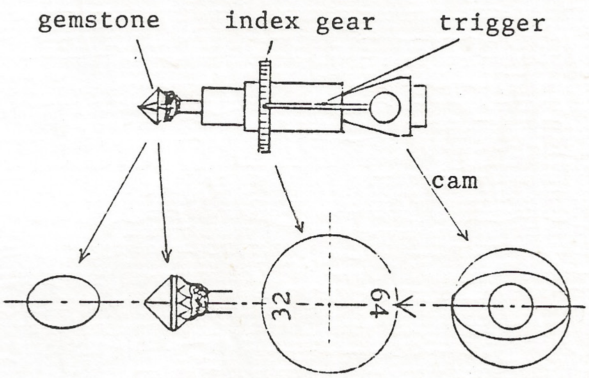
Transfer the gemstone to the another dop stick by use of a transfer block (see page 10).

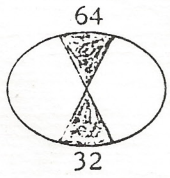
9, Cutting the pavilion main and lower girdle facets

Mount the transferred gemstone into the faceter spindle. Check the alignment.

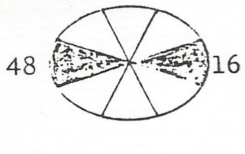
Engage the trigger in 64 and set the cutting angle at 44 keeping the lower cam follower in contact with the cam. All other cutting angles will be automatically set by the patented cam.

Indexing at 2 cutting angle at 45.5°, all other angles of lower girdle facet are set automatically.

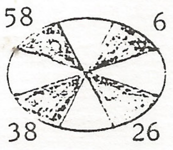




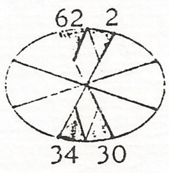
cutting angle 44°



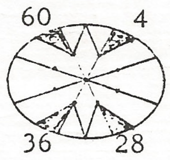
cutting angle 36°



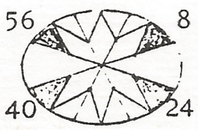
cutting angle 42.5°



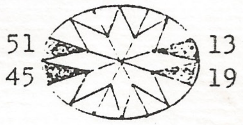
cutting angle 45.5°



cutting angle 45°



cutting angle 43°



cutting angle 38.5°

Girdle line must be straight.

10, Polishing the pavilion facets

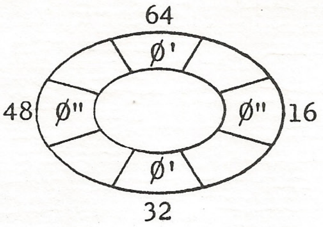
Polishing is done in the same procedure and other as cutting, using the same angles and indexes. The polishing order is as follows:

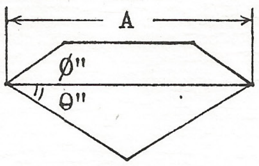
Pavilion main facets - Lower girdle facets

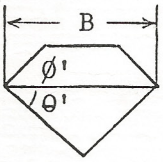
11, Polishing the girdle

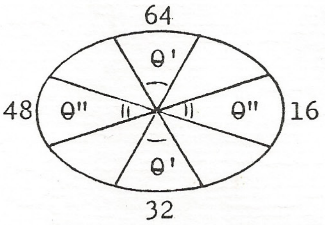
The girdle can be polished in the same method as girdle cutting. Keeping the UCF in contact with the cam, gently lower the stone to the polishing lap and polish the girdle while turning the stone. An alternative and faster method is to remove the dopped stone from the spindle and polish it freehand.

HOW TO SET THE UPPER CAM FOLLOWER AND LOWER CAM FOLLOWER TO CUT BRILLIANT OVAL









$$\frac{\tan\theta'}{\tan\theta''} = \frac{A}{B}$$

$\varnothing' = \varnothing + d$

Ø: Crown main facet angle for standard brilliant cut
(See the table on page 13, 14.)

d: Compensation value to get better brilliancy
Advisable value: 0.5°- 3°

A: Length of major axis

B: Length of minor axis

$\theta' = \theta + d$

θ: Pavilion main facet angle for standard brilliant cut
(See the table on page 13, 14.)

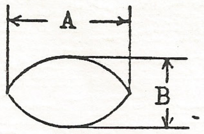
UCF: Graduation on upper cam follower
LCF: Graduation on lower cam follower

A x B mm	A/B	A - B mm	UCF	LCF	d	θ'	θ"	θ' - θ"
4 x 6	1.500	2	3.8	18.6	1.5°	44.5°	33°	11.5°
6 x 8	1.333	2	3.8	14.8	1°	44°	36°	8.0°
6 x 10	1.667	4	5.8	20.8	2°	45°	31°	14.0°
6 x 12	2.000	6	7.5	—	3°	46°	27.5°	18.5°
8 x 10	1.250	2	3.8	12.9	0.5°	43.5°	37°	6.5°
8 x 12	1.500	4	5.8	18.6	1.5°	44.5°	33°	11.5°
8 x 14	1.750	6	7.5	—	2.5°	45.5°	30°	15.5°
10 x 12	1.200	2	3.7	10.6	0.5°	43.5°	38.5°	5.0°
10 x 14	1.400	4	5.8	16.5	1°	44°	34.5°	9.5°
10 x 20	2.000	10	10.3	—	3°	46°	27.5°	18.5°
12 x 14	1.167	2	3.7	9.8	0.5°	43.5°	39°	4.5°
12 x 16	1.333	4	5.7	14.8	1°	44°	36°	8.0°
12 x 20	1.667	8	8.8	20.8	2°	45°	31°	14.0°
13 x 18	1.385	5	6.5	16.0	1°	44°	35°	9.0°
15 x 20	1.333	5	6.5	14.8	1°	44°	36°	8.0°
18 x 25	1.389	7	8.0	16.0	1°	44°	35°	9.0°

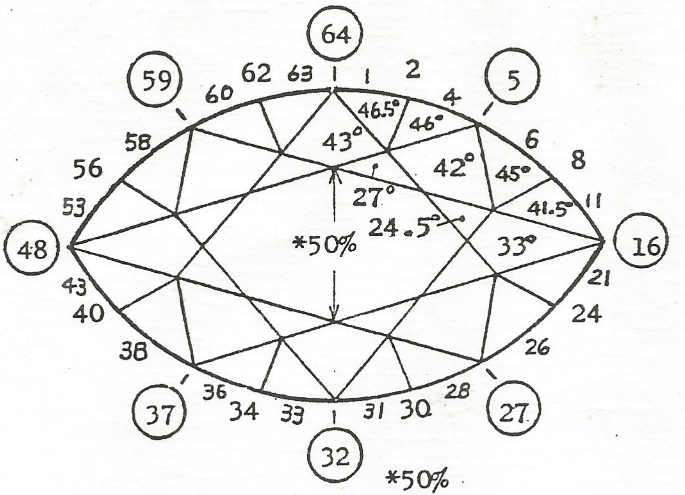
NOTE: (1) The table shows the approximate values for quartz group.
(2) Crown main facet angle θ=42°, pavilion main facet angle Ø=43°.
(3) The same LCF setting position is used to cut both crown and pavilion facets.

MARQUISE, Quartz

$\frac{A}{B} = \frac{7}{4} = 1.75$

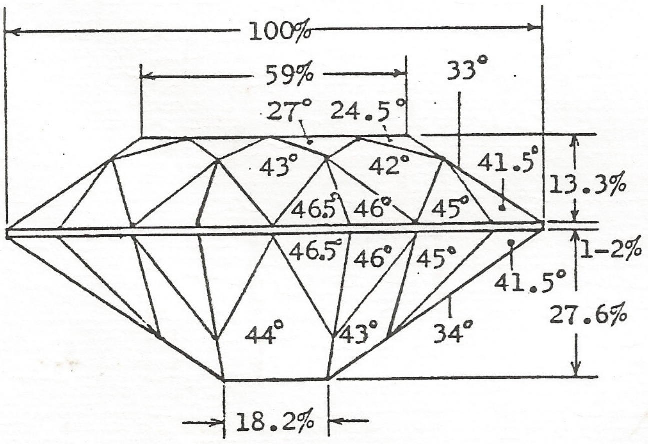


CROWN

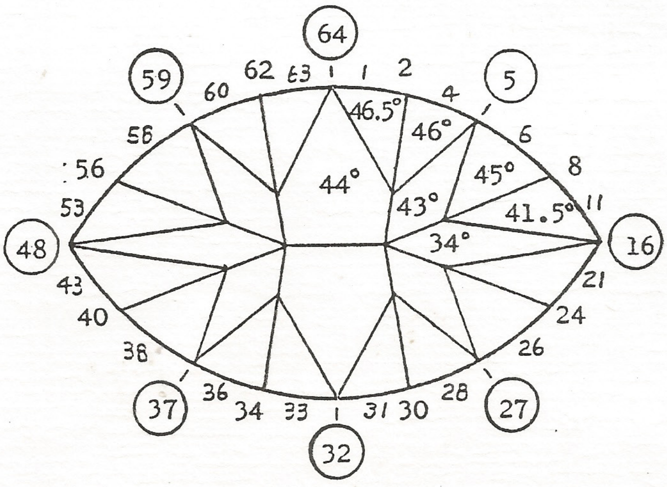


*50%
Minor axis B = 100%

SIDE VIEW



PAVILION



FACETING ORDER OF CROWN

1, CUTTING ORDER

a, Girdle

b, Table at 0°

c, Crown main facet

43°	Index 64-32
42°	Index 5-27-37-59
33°	Index 16-48

d, Star facet

27°	Index 2-62-30-34
24.5°	Index 8-24-40-56

e, Upper girdle facet

46.5°±	Index 1-63-31-33
46°±	Index 4-28-36-60
45°±	Index 6-26-38-58
41.5°±	Index 11-21-43-53

2, POLISHING ORDER

Table - Star facet - Crown main facet - Upper girdle facet

TRANSFERRING

FACETING ORDER OF PAVILION

1, CUTTING ORDER

a, Pavilion main facet

44°	Index 64-32
43°	Index 5-27-37-59
34°	Index 16-48

b, Lower girdle facet

46.5°	Index 1-63-31-33
46°	Index 4-28-36-60
45°	Index 6-26-38-58
41.5°	Index 11-21-43-53

2, POLISHING ORDER

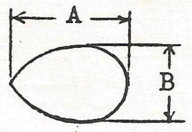
Pavilion main facet - Lower girdle facet

GIRDLE FINISHING

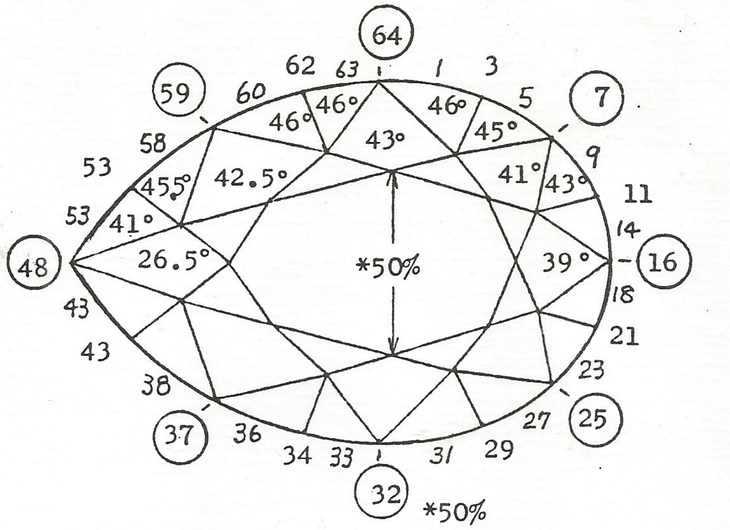
NOTE: All cutting angles are given by the cam.

PENDELOQUE, Quartz

$\frac{A}{B} = \frac{3}{2} = 1.5$

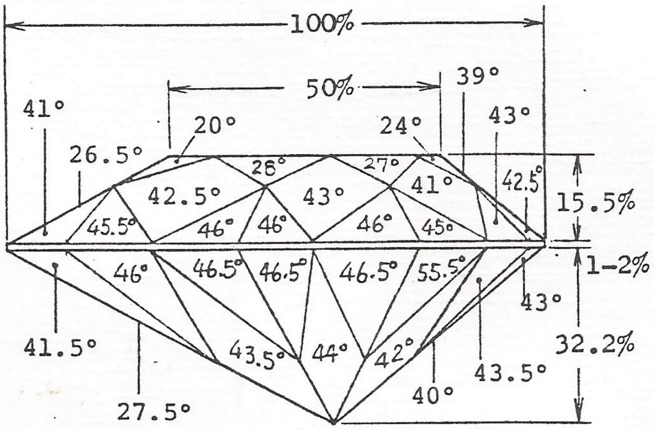


CROWN

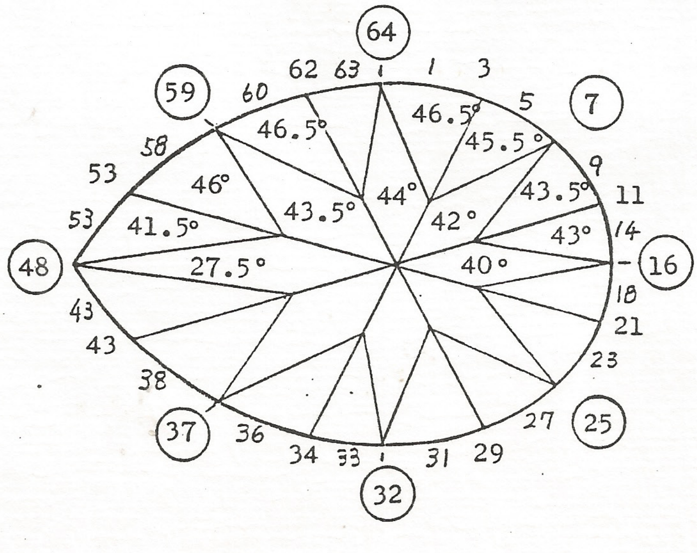


*50%
Minor axis B = 100%

SIDE VIEW



PAVILION



FACETTING ORDER OF CROWN

1, CUTTING ORDER

a, Girdle

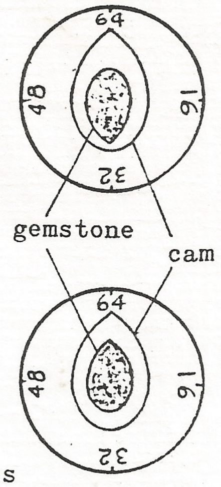
Use pendeloque cam and upper cam follower.

b, Table at 0°

Turn the dop stick 180°, check to see the alignment.

c, Crown main facet

Cutting angles are given automatically by the cam except 26.5° indexing at 48.



d, Star facet

20° at 43 and 53 is not given automatically.

e, Upper girdle facet

41°± at 43 and 53 is not given automatically.

2, POLISHING ORDER

Table – Star facet – Crown main facet – Upper girdle facet

TRANSFERRING

FACETTING ORDER OF PAVILION

1, CUTTING ORDER

a, Pavilion main facet

27.5° at 48 is not given automatically.

b, Lower girdle facet

41.5° at 43 and 53 is not given automatically.

2, POLISHING ORDER

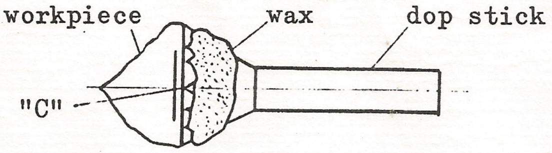
Pavilion main facet – Lower girdle facet

GIRDLE FINISHING

HOW TO GET THE EXACT ALIGNMENT OF CROWN AND PAVILION FACETS

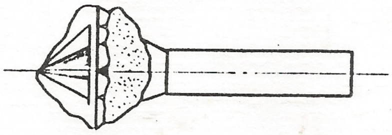
After finishing the crown, transfer the workpiece to the other dop stick giving attention to the following so that the correct alignment is assured.

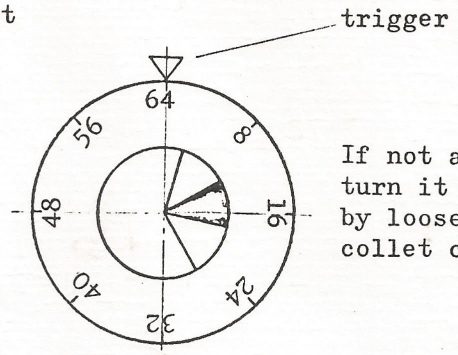
①



The center "C" of crown main facet can be identified.

②

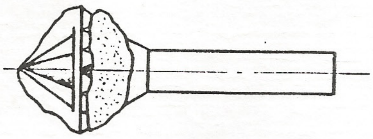


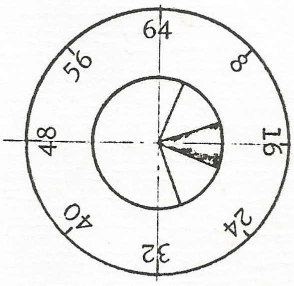


If not aligned, turn it this way by loosening the collet chuck.

Mount the workpiece to the collet chuck. (approximately aligned) Cut 3 main facets and collect the alignment.

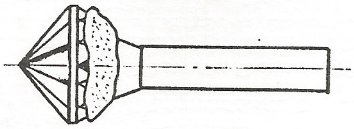
③

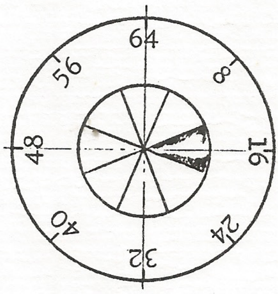




Cut 3 main facets once again and check to see alignment.

④

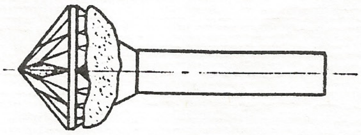


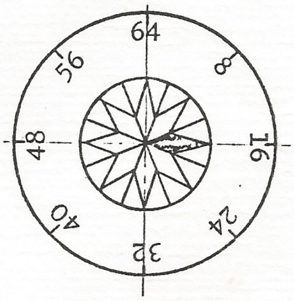


If not perfectly aligned, correct them once more.

Cut 8 main facets, and check to see the perfect alignment.

⑤

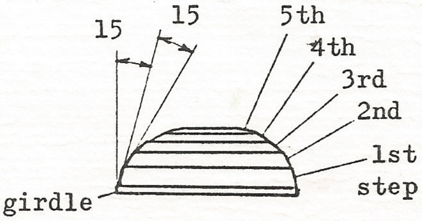




In case of using Faceter-P or UT, a slight difference on alignment can be corrected by turning the worm dial.

Cut 16 upper girdle facets.

CABOCHON-MAKING BY FACETER-C

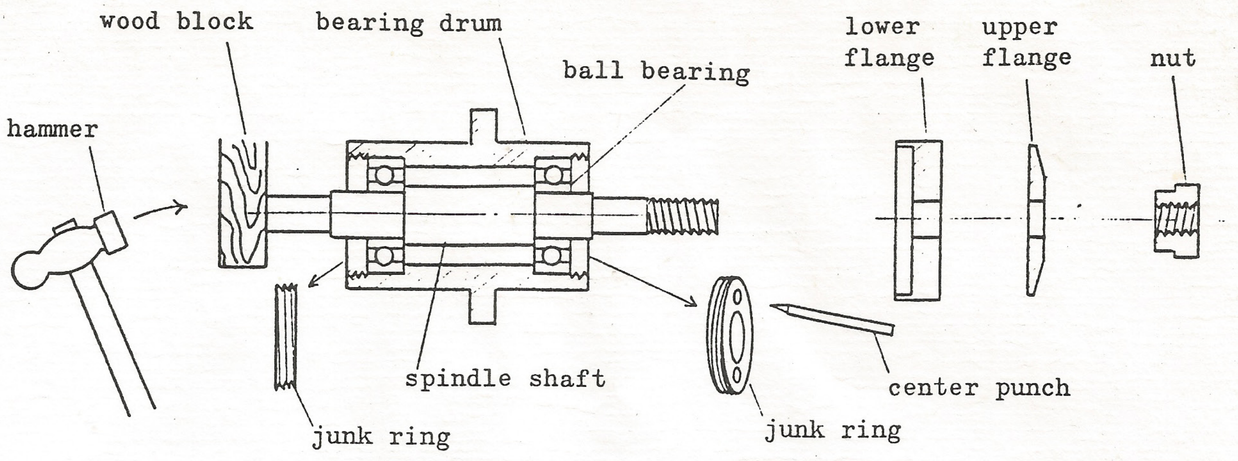


1, Cut the girdle using the cam and upper cam follower.

2, Change the cutting angles at intervals of about 15 degrees and cut the workpiece at 5 to 6 steps in the same way as in girdle cutting.

3, Remove it from the faceter and finish it by hand.

HOW TO REPAIR THE SPINDLE ARBOR AND THE BALL BEARINGS



Remove the junk rings by turning them counter clockwise using a center punch. Remove the spindle shaft from the bearing drum by hitting the spindle end by use of a wood block.
All parts can be easily removed and replaced with new ones.

NOTE:

(1) The main switch of the machine must be OFF position when the machine is plugged into the electric source.

(2) Metal laps are usually cast into a mold, and are machined or faced so that the surface will be true and smooth, eliminating any wobble.
The lap should run within 0.15 mm when truing, and its thickness should not be thinner than 8 mm.

(3) After loosening the collet nut of the Faceter, puch collet chuck toward the gemstone. Then the dop stick can be easily removed.

(4) When tightening or loosening the spindle nut of the machine, hold the drive belt with hand to prevent rotation of the spindle, if necessary.

(5) Keep your abrasive jars covered when not in use to prevent them from any dust and contamination.

(6) The secret of a good polish is not found in the polishing technique, but in the sanding or pre-polishing process. In order to get good results, every cutting process must be worked up in a proper manner spending much time. The traces and the scratches on the stone surface borne at the former lapping stage must be entirely disposed of at the next stage.

(7) Do not apply heavy pressure during cutting and polishing.

(8) The facets which are in the same symmetrical position should be cut at the same conditions such as the same level, cutting pressure, cutting time and lap condition.

(9) Do not try a new type trial cut with precious gem material. Always start to practice a new cut on quarts group material.

(10) Do not blame the machine for your own mistakes. The machine will do only what you make it do. Try again and again without being discouraged by your mistakes. You will learn through your mistakes, seldom through your successes.

IMAHASHI

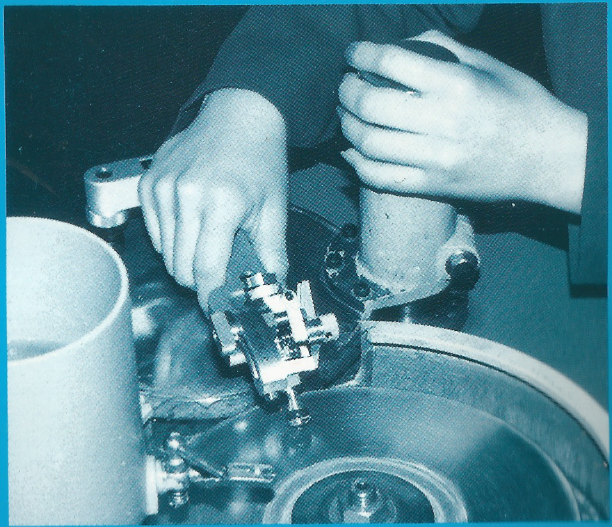
IMAHASHI MFG. CO., LTD.

Head office 533 Hino, Hino-shi, Tokyo, Japan
Telephone: (0425) 82-1508
Telex: 02842130 IMAC J
Facsimile: (0425) 84-2780

Kofu factory 3-10-5 Asake, Kofu-shi, Japan
Telephone: (0552) 32-3143

Printed in Japan

LAPIDARY EQUIPMENT



IMAHASHI MFG. CO., LTD.

Contents

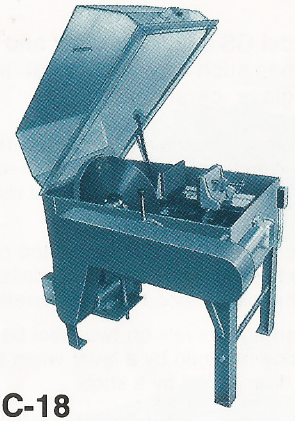
Slab Saw 1
Gem Slicing Machine 2
Trim Saw 3
Dual Grinder 4
Horizontal Lapidary Machine 5
Horizontal Lapidary Machine 6
Calibrating Machine 7
Faceting Machine (heavy type) 8
Faceting Unit 9
Round Bead Lapping Machine 10
Ultrasonic Drilling Machine 11
Gem Carving Machine.................... 12
Centerless Grinding Machine 13
Barrel Finishing Machine 14
Diamond Polishing Bench 15
Automatic Polishing Machine 16
Vibrasonic Tumblers 17

SLAB SAW

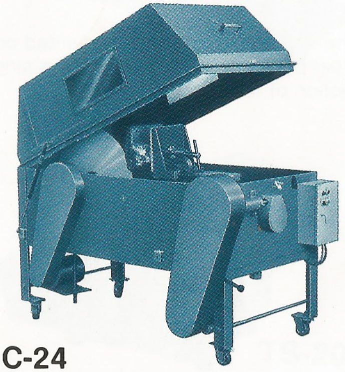
AC-18, AC-24

These Slab Saws are used to saw gemstones such as rock crystal, agate, jade, glass, ceramics, etc.

- The machines with power feed are precision engineered and sturdily built to give years of satisfactory service.
  Feed rate can be changed infinitely by a lever according to variations in rock hardness.
- The automatic cut-off switch is adjustable for length of cut. The magnetic switch protects the motor from overload damage.
- The carriage slides on two square guide rods with the help of ball bearings, and the lateral cross feed is made by a handle with graduated dial for cutting multiple slabs.
  The split nut, driving a carriage when engaged into the leadscrew, is released by a flip of a lever for quick carriage return.
- A small hand-operated pinion gear mounted on the carriage enables the carriage to be returned smoothly.
- To prevent the coolant from splashing, Model AC-18 has a plastic hood and Models AC-24 have rigid metal hoods with plastic windows.



AC-18



AC-24

SPECIFICATIONS

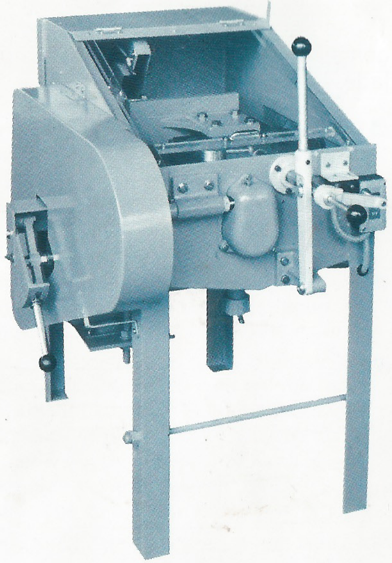
	AC-18	AC-24
Height	1100 mm	1260 mm
Width × Depth	800 × 1100 mm	900 × 1800 mm
Spindle speed	1400 rpm	715 rpm
Feed range, infinitely variable	4-20 mm/min	3-15 mm/min
Diameter of diamond blade, max.	450 mm	610 mm
Motor	0.75 kW	0.2, 1.5 kW
Net weight	180 kg	450 kg

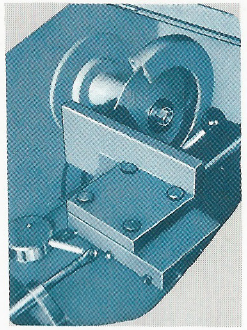
GEM SLICING MACHINE

GS-2

The Model GS-2 is for sawing and slicing gemstones such as rock crystal, agate, optical glass, ceramics, etc.

- This compact machine with power feed is sturdily built and precision machined to give maximum rigidity for professional mass production.
- All operating handles are mounted outside the body case so that it is unnecessary to open the plastic hood during operation.
- The carriage travels on two steel bars and is quickly returned by a lever when the split nut is disengaged by a knob.
- The automatic cut-off switch is adjustable for length of cut.
  The motor is equipped with reset overload protection.
- The fist-sized workpiece cemented on a steel plate can be easily set by a single motion of the lever.





SPECIFICATIONS

Height	850 mm
Width x Depth	760 x 1050 mm
Spindle speed	2035, 2500 rpm
Feed range, infinitely variable	4-20 mm
Diameter of diamond blade	200, 250 mm
Motor	400 W
Net weight	150 kg

TRIM SAW

TS-150, TS-200, TS-200P, TS-200PS

These trim saws are used to trim slabs and small pieces of precious stone, semi-precious stone, glass, shell, ceramics, rock and other minerals.

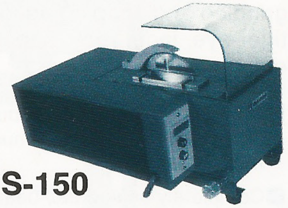
- These trim saws are precision built to give years of trouble-free service for continuous hard work.
- A cutting coolant in the body case is sprayed onto the workpiece by the rotary motion of the saw blade.
  A plastic hood is provided to prevent the coolant from splashing.
- Exceptionally quiet operation makes these machines favorites for use in any place.

TS-150
This is used to trim small pieces of gemstone etc. The table can be easily removed by lifting it up.

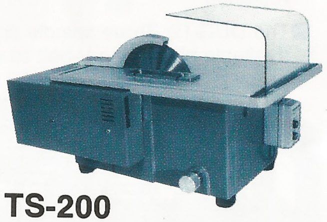
TS-200
Features a rimless flat table. Long and wide workpieces can be trimmed. A part of table is removable for blade replacement and body case cleaning.

TS-200P
This is a powerful version of TS-200 equipped with 400W motor.

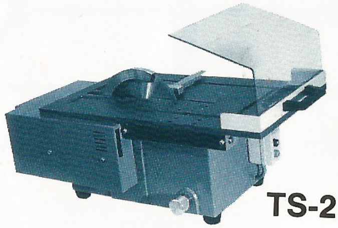
TS-200PS
The slide table mounted on TS-200P machine body travels smoothly along two guide rods.



TS-150



TS-200



TS-200PS

SPECIFICATIONS

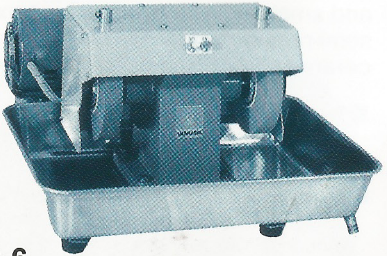
	TS-150	TS-200	TS-200P	TS-200PS
Height (without shield)	255 mm	315 mm	315 mm	315 mm
Width × depth	265×470 mm	335×600 mm	335×600 mm	340×600 mm
Table, length × width	290×160 mm	480×310 mm	480×310 mm	540×320 mm
Max. thickness to be cut.	38 mm	60 mm	60 mm	57 mm
Spindle speed, 50 Hz	2300,3350 rpm	2300,3350 rpm	2300,3350 rpm	2300,3350 rpm
Diameter of saw blade	150 mm	150,200 mm	150,200 mm	150,200 mm
Hole size of saw blade	20 mm	20 mm	20 mm	20 mm
Motor	200 W	200 W	400 W	400 W
Net weight, approx.	20 kg	25 kg	30 kg	33 kg

DUAL GRINDER

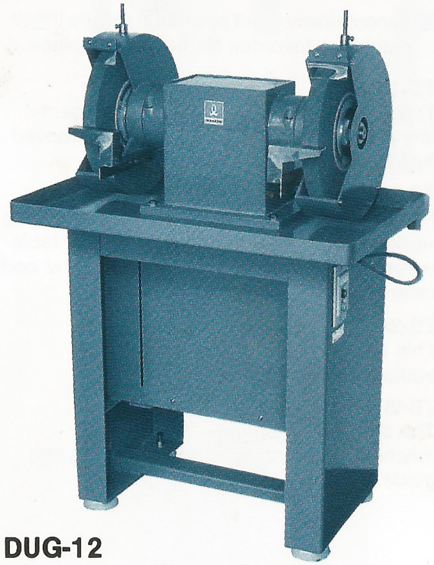
DUG-6, DUG-12

These modern machines are used for grinding and shaping agate, rock crystal, tiger-eye, jade, ruby, sapphire, garnet, etc.

- The grinders are sturdily built and precision engineered to give maximum rigidity for hard work.
- Completely sealed ball bearings insure vibration-free spindle operation.
- Grinding wheels are easily changed and replaced.
- The DUG-12: Three spindle speeds are available by shifting V-belt to different grooves in the pulley.
  This model is recommended for professional hard work.



DUG-6



DUG-12

SPECIFICATIONS

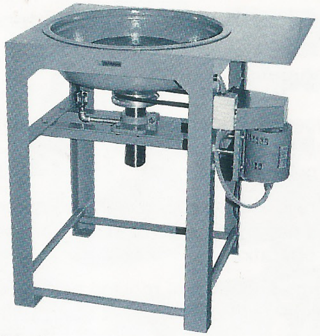
	DUG-6	DUG-12
Height	300 mm	1000 mm
Width × Depth	500 × 550 mm	430 × 720 mm
Spindle speed	2500 rpm	1200, 1500, 2000 rpm
Diameter of grinding wheel	150 mm	300 mm
Thickness of grinding wheel	25 mm	25-38 mm
Motor	200 W	400 W
Net weight	25 kg	90 kg

HORIZONTAL LAPIDARY MACHINE

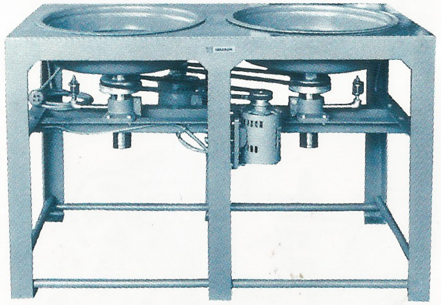
PW-1, PW-2

These lapidary machines are used to grind, lap and polish agate, rock crystal, jade, optical glass, ceramics and other minerals.

- A sturdy steel construction and precision engineering give the user years of trouble-free service.
- The spindle is provided with heavy duty sealed plane bearings which insure smooth, quiet, vibration-free running.
- Bearings and all vital moving parts are completely shielded against abrasives and water.
- These machines are recommended to lap and polish various workpieces, such as flat slabs, cubes, cabochons, etc., using loose abrasives.



PW-1



PW-2

SPECIFICATIONS

	PW-1	PW-2
Height	800 mm	800 mm
Width × Depth	780 × 580 mm	1230 × 600 mm
Spindle speeds	600, 750 rpm	600, 750 rpm
Lap diameter	270 mm	270 mm
Splash pan diameter	480 mm	480 mm
Motors, 1 or 3 phase	200 W	2 × 200 W
Net weight	90 kg	165 kg

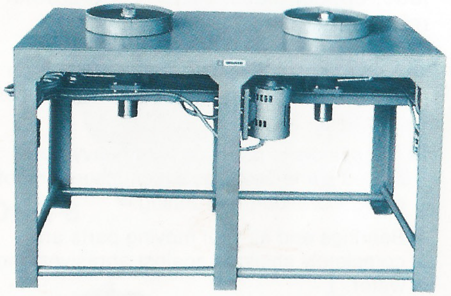
HORIZONTAL LAPIDARY MACHINE

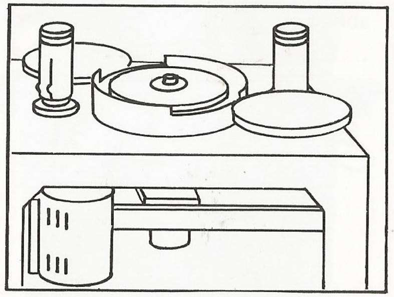
PD-2

This machine is used to lap and facet gemstones including synthetic gemstones.

- A rugged steel construction and precision machined spindle assembly provide maximum reliability.
- The spindle is equipped with heavy-duty sealed plane bearings to insure smooth, quiet operation.
- Bearings and all vital moving parts are completely shielded against abrasives and dust.
- Four workers can use one machine at the same time.
  All types of faceter are available.

  Faceters C, P, UT. . . . with faceter tables (option)





Faceter tables are mounted. (option)

SPECIFICATIONS

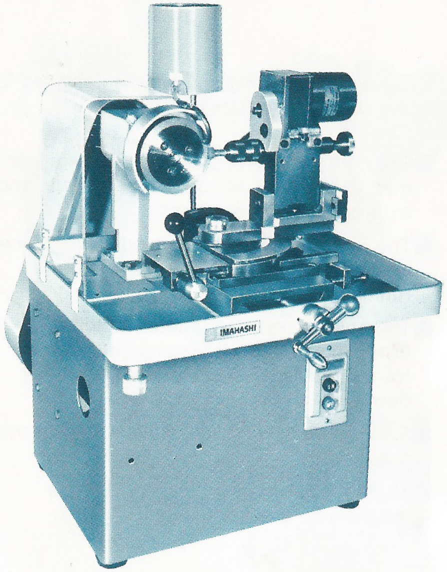
Height	770 mm
Width × Depth	1230 × 600 mm
Spindle speed	950, 1200 rpm
Lap diameter	200-250 mm
Motors	2 × 200 W
Net weight	155 kg

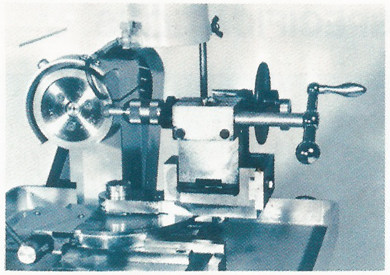
CALIBRATING MACHINE

CAL-2

This machine is specially designed for calibrating and chamfering gemstones using a diamond wheel.

- This compact CAL-2 machine, designed for versatility and convenience, can outperform most other machines of its type.
- The accurate girdle line of gemstones can be easily ground by the interchangeable cam mounted on the workpiece spindle.
- The body and spindle bracket of the diamond wheel are made of heavy cast aluminum.
  The workpiece spindle swivels up to 90 degrees against the diamond wheel for bevel and table grinding.
- Making preforms for faceting with the plain diamond wheel and shaping cabochons with the grooved diamond wheel can be done even by beginners.





A manual driving attachment in place of a power driving unit.

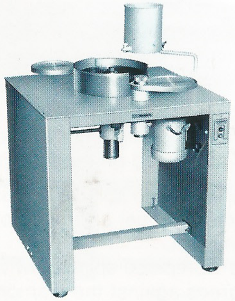
SPECIFICATIONS

Height	660 mm
Width × Depth	460 × 540 mm
Diameter of diamond wheel	100 mm
Spindle speeds, diamond wheel	2600, 3500 rpm
workpiece	60 rpm
Motors, diamond wheel	200 W
workpiece	15 W
Net weight	46 kg

FACETING MACHINE (heavy type)

FAC-10

This precision faceting machine is designed for heavy duty professional work.



- The built in drive rugged construction with machine mounts absorbs both internal and external vibrations.
- The precision machined spindle with plane bearings assures smooth and accurate running.
- The spindle unit and faceter tables are firmly mounted on the same cast iron frame, resulting in exceptional accuracy between lap and faceter tables.
- Two operators can use the machine at the same time.
- Three faceler models C, P and UT are available for this machine.

SPECIFICATIONS

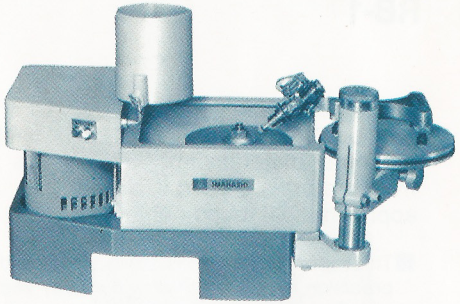
Width × Depth	700 × 660 mm
Height of table	700 mm
Spindle speed	340, 640, 1050, 1700 rpm
Lap diameter	150-250 mm
Power required	400 W
Net weight	100 kg

FACETER

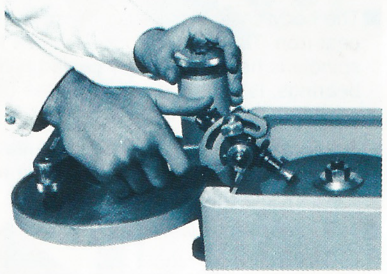
- All faceters consist of a cast aluminum frame with a protractor and a faceter spindle assembly.
- Since the faceters are not connected to the machine, they may be lifted off the table quickly and turned inside out for easy inspection.
- Cutting of the table can be easily executed without a 45-degree dop stick.
- The Faceter-C has replaceable cams which permit correct forming of the girdle of various shapes from perfectly round to long and narrow. The cutting angle is automatically set by the cam.
- The Faceter-P and Faceter-UT have a dual indexing device which facilitates easy indexing.
  The index gear used in combination with the worm and worm wheel allows extra fine indexing in a wide range.

FACETING UNIT

FAC-8



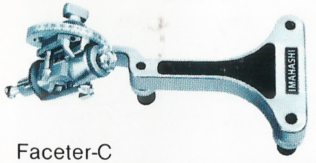
The most popular faceting equipment for professionals and hobbyists ever offered for lapidary work.
Preforming, faceting and cabochon making can be done with this single machine.



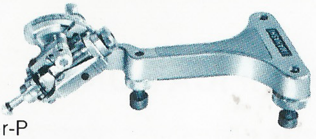
- The lap arbor mounted in a cast aluminum housing is constructed with sealed ball bearings that insure smooth running, with no vibration.
- The faceter table is raised or lowered in relation to the lap by a micrometer dial to allow the operator accurate control of the cutting depth.
- Grinding, sanding, lapping and polishing can all be made with the same machine.
- Faceters C, P and UT can be used with this unit.

SPECIFICATIONS

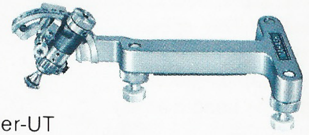
Height	270 mm
Width × Depth	650 × 270 mm
Spindle speed	600, 1430 rpm
Lap diameter	150-200 mm
Motor	200 W
Net weight	23 kg



Faceter-C
Standard type with replaceable cams.



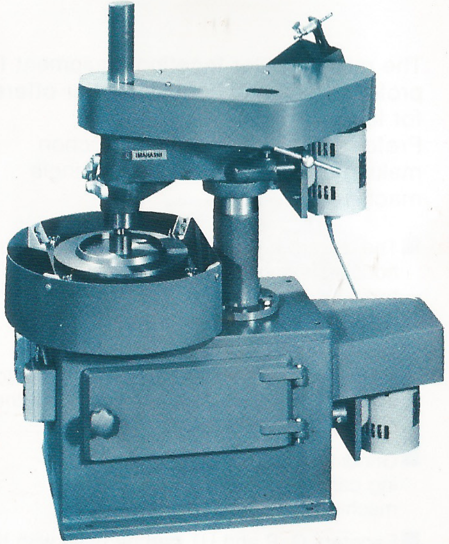
Faceter-P
Rigid type suitable for recutting faceted gemstone.



Faceter-UT
Palm-held light type suitable for mass production.

ROUND BEAD LAPPING MACHINE

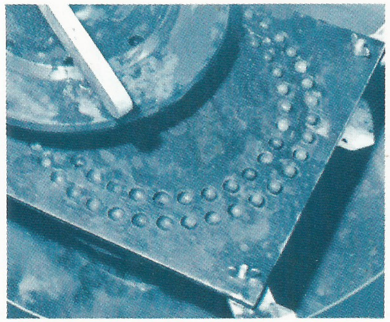
RB-1



This machine is used to lap semi-precious stones, coral, glass, sea shells and other materials into round beads from preforms ground to an approximately round contour.

- This lapping machine is sturdily built and precision machined to provide many years of trouble-free professional production.
- The body case and over arm are of rigid cast iron. The upper arbor, in which the spindle is held in place by sealed ball bearings, is mounted solidly on the body case by a steel column.
- The lower arbor is provided with heavy-duty plane bronze bearings which insure a smooth, vibration-free operation.
- The upper and lower spindles are driven by separate motors.

  The upper lap lifts up and swivels to the side for easy loading and unloading of the workpiece.
- It only takes about 10 minutes to lap 60 pieces of quartz into 10 mm beads.
- The beads lapped by this machine are polished by an additional step, usually by a barrel finishing machine.



SPECIFICATIONS

Height	880 mm
Width × Depth	650 × 770 mm
Lower lap speed	400, 500 rpm
Upper spindle speed	160 rpm
Vertical travel of upper spindle	50 mm
Lower lap diameter	250 mm
Lappable bead diameter	3-22 mm
Motors	2 × 200 W
Net weight	150 kg

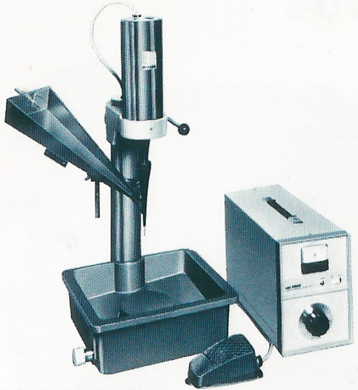
ULTRASONIC DRILLING MACHINE

USD-150CS, USD-150C

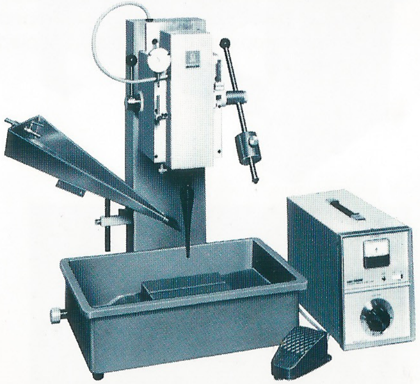
These machines are used for drilling, core drilling and engraving glass, ceramics and gemstones by ultrasonic vibration of the tool using an abrasive slurry.

ULTRASONIC GENERATOR
The generator produces alternating-current of ultrasonic frequency which is used as the source for vibration energy.

MACHINING UNIT
Ultrasonic energy from the generator is applied to the transducer where it is converted into mechanical vibration of the tool.
The vibrating tool, with abrasives and water, removes the material from the workpiece by crushing. Any shape of hole can be drilled into brittle materials.



USD-150CS



USD-150C

SPECIFICATIONS

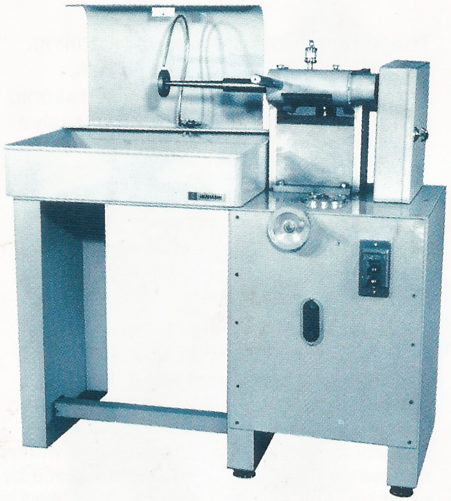
ULTRASONIC GENERATOR	USD-150CS	USD-150C
Power source, single phase, 50/60Hz	110,115,200,220,240 V	110,115,200,220,240 V
Output, maximum (infinitely variable)	150 W	150 W
Oscillation frequency	20 kHz	20 kHz
Height x Width x Depth	280 x 180 x 400 mm	280 x 180 x400 mm
Net weight	14 kg	14 kg

MACHINING UNIT	USD-150CS	USD-150C
Vertical travel, transducer case	200 mm	50 mm
Hole size that can be drilled	(using solid wire) 0.8-2 mm	0.8-2 mm
	(using steel pipe) 2-25 mm	2-25 mm
Height x Width x Depth	820 x 400 x 430 mm	750 x 570 x 460 mm
Net weight	16 kg	50 kg

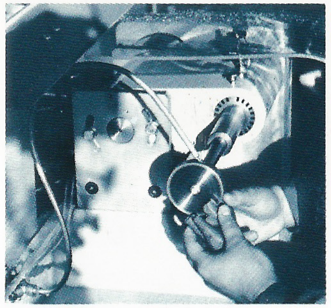
GEM CARVING MACHINE

CVG-3

This machine is specially designed for gemstone carving with various diamond tools.



- The precision spindle and oil-less bearings ensure smooth running during long continuous operation.
- The spindle speed is infinitely variable from 1000 to 9000 rpm.
- The spindle position can be raised or lowered according to the size of the workpiece.
- The interchangeable arbors and various tools can be easily and quickly clamped. A dental handpiece can also be coupled to this machine.



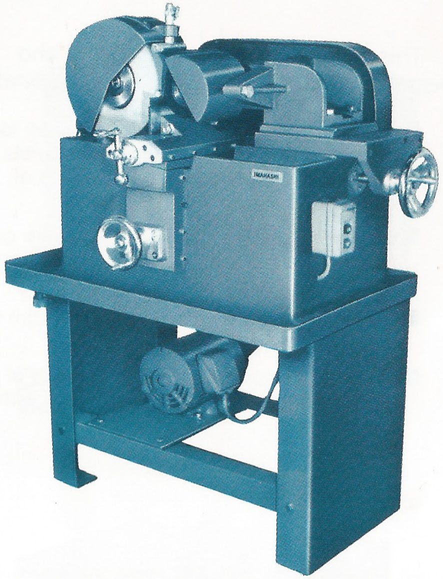
SPECIFICATIONS

Width × Depth	930 × 420 mm
Height of spindle, maximum	890 mm
Spindle speed, infinitely variable	1000-9000 rpm
Spindle hole	Morse taper #2
Vertical movement of spindle	120 mm
Motor	750 W
Net weight	200 kg

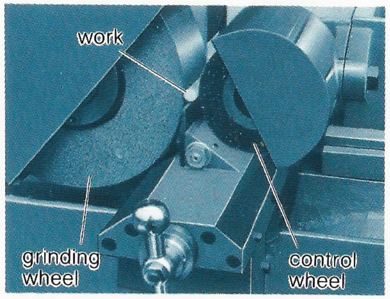
CENTERLESS GRINDING MACHINE

CGB-8

This machine is designed for cylindrical grinding of semi-precious stones, optical glass, ceramics, etc..



- Sturdy construction and precision engineering provide many years of satisfactory service with a minimum of maintenance.
- Heavy-duty sealed ball bearings insure smooth, vibration-free spindle operation.
- The grinding wheel, control wheel and work blade are independently adjustable by handles.
- Dressing of grinding wheel can be easily done with the diamond dresser mounted on the work blade holder.
- Good results can be achieved efficiently, either by a through-feed method or by an in-feed method.



SPECIFICATIONS

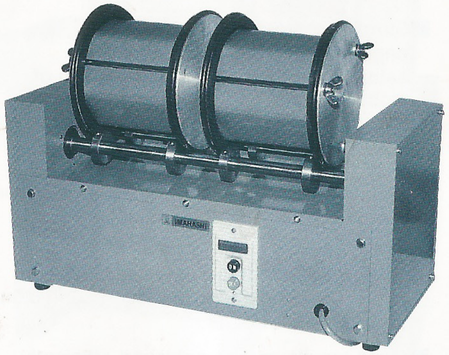
Height	1000 mm
Width × Depth	900 × 680 mm
Dimension of grinding wheel	200 × 75 mm
Dimension of control wheel	90 × 75 mm
Grinding wheel speed	1000 rpm
Control wheel speed	240 rpm
Workpiece diameter	2-25 mm
Motor	750 W
Net weight	170 kg

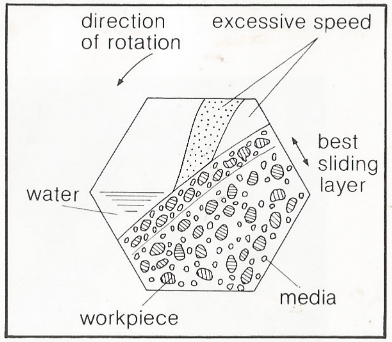
BARREL FINISHING MACHINE

BF-2

This machine is used for lapping and polishing rock crystal, agate, jasper, etc.

- The BF-2 with two plastic barrels is an ideal unit for both professionals and hobbyists who wish to process small quantities of materials.
- Completely sealed ball bearings insure quiet running and maintenance-free service over long, continuous use.
- The barrels can be easily removed from the unit for loading and cleaning.
- Jewelry findings and mountings made of silver or gold can also be processed with this machine.





SLIDING TUMBLE ACTION
IN BARREL

SPECIFICATIONS

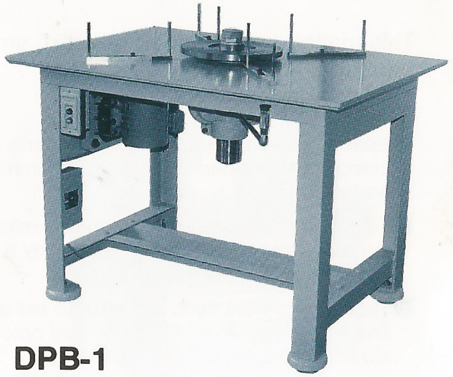
Height	410 mm
Width x Depth	575 x 250 mm
Barrel capacity	2 liter
Barrel speed	50/60 Hz, 57 rpm
Motor	200 W
Net weight	23 kg

DIAMOND POLISHING BENCH

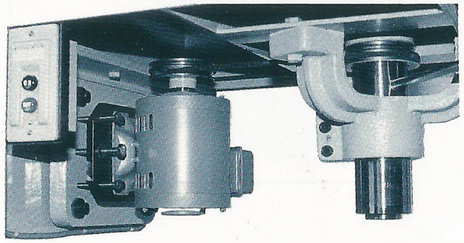
DPB-1, DPB-3

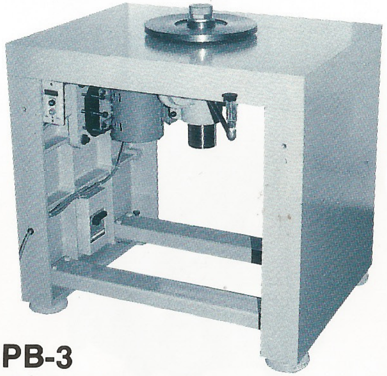
This modern unit is used to grind and polish rough diamonds for jewelry and industrial use. Superior precision engineering assures excellent results.

- A sturdy body frame with built-in drive unit absorbs both internal and external vibration.
- The precision spindle shaft and plane bearings assure smooth, accurate running for long, continuous operation.
  Lubricating oil circulates continuously in the bearing drum.
- The spindle is driven by a special belt which quarantees perfect transmission.
  The bearings are completely sealed against abrasives and dust.
- The precision machined table surface is parallel to the scaife.
  The motor is mounted under the table using anti-vibration rubber bushings.
- A perfect scaife level can easily be found and set by adjusting the machine mounts. Neither special foundations nor installation is necessary.



DPB-1
Steel body frame





DPB-3
Cast iron body frame
Cast iron body frame assures higher absorption of vibration

SPECIFICATIONS

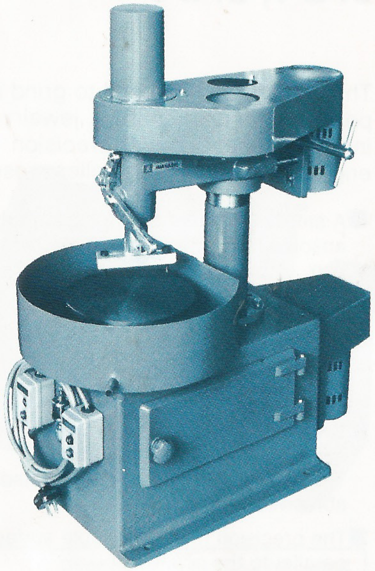
	DPB-1	DPB-3
Height of table	800 mm	800 mm
Table size	800 × 1100 mm	670 × 850 mm
Spindle speed	2500, 3000 rpm	2500, 3000 rpm
Scaife diameter	250–310 mm	250–300 mm
Motor	3 phase, 750 W	3 phase, 750 W
Net weight	260 kg	350 kg

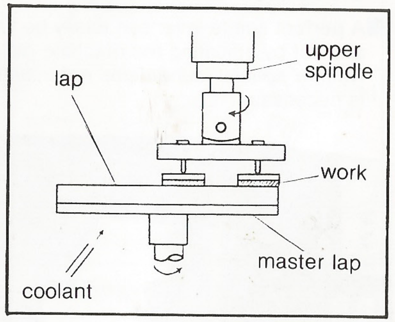
AUTOMATIC POLISHING MACHINE

PAB-2

This machine is designed to polish small flat surface of gemstones, watch bearings, semi-conductors, etc.

- Bearings and all essential moving parts are completely shielded against contamination and water.
- To prevent overheating, the lap and master lap can be cooled when necessary by a water jet under the master lap.
- The lap and workpiece are easy to set up. The workpiece is usually cemented onto the steel flat disc for efficient polishing.
- The upper and lower spindles are driven by separate motors. The upper spindle lifts up and swivels to the side.





SPECIFICATIONS

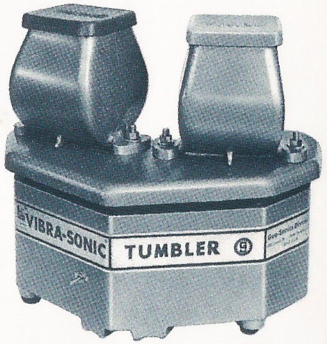
Height	950 mm
Width × Depth	830 × 500 mm
Lap speed	150, 170, 190, 210 rpm
Upper spindle speed	150, 190 rpm
Vertical travel of upper spindle	50 mm
Lap dimension	250ϕ × 25 mm
Motors	2 × 200 W
Net weight	130 kg

Vibrasonic Tumblers

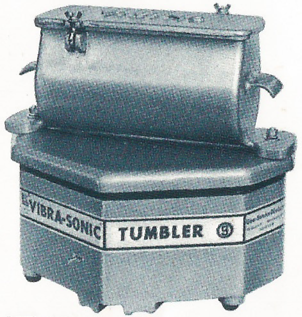
VT-35, VT-14, VT-12

These machines are used for chamferring, lapping and polishing gemsotnes, glass, ceramics, coral, sea shells and other minerals.

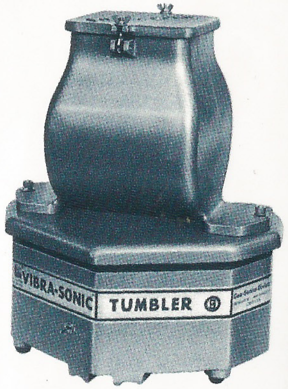
- Using a different vibrating process with rotary motion, vibrasonic tumbler offer high quality new lapping and polishing in wet or semi-wet states. The processing speed may be reduced to more than half that of rotary type methods.
- Cast aluminum hoppers are lined with polyvinyl for ease in cleaing and quiet chip free opration. Hopper lids are opened for easy inspection.
- Tumbling action can be changed by adjusting the dial of the eccentic weight to suit any type of road.



VT-12



VT-14



VT-35

SPECIFICATIONS

Model	VT-35		VT-14		VT-12	
Height	530	mm	400	mm	400	mm
Depth × Width	300 × 440	mm	300 × 440	mm	300 × 440	mm
Number of hopper	1	pc	1	pc	2	pc
Hopper capacity	11.4	l	4.5	l	1.5 × 2	l
Motor	200	W	200	W	200	W
Net weight	27	kg	24	kg	22	kg

MEMO

Remarks: RPM indicated in the specifications are based on 50Hz electric supply.
All specifications are subject to change without notice.